DOCUMENT RESUME

ED 140 518 EC 100 856

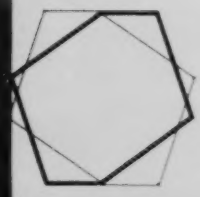
AUTHOR Perlman, Joseph; Stober, Marvin
TITLE Program Planning Guidelines: A Review of Research with Implications for the Education and Training of the Severely to Profoundly Mentally Retarded.
INSTITUTION City Univ. of New York, N.Y. Graduate School and Univ. Center.
SPONS AGENCY Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.
PUB DATE 76
CONTRACT OEC-0-74-7895
NOTE 129p.

EDRS PRICE MF-$0.83 HC-$7.35 Plus Postage.
DESCRIPTORS *Annotated Bibliographies; *Behavior Change; Communication Skills; *Custodial Mentally Handicapped; Discrimination Learning; *Educational Diagnosis; Exceptional Child Research; Guidelines; Mentally Handicapped; Program Planning; Psychomotor Skills; *Research Reviews (Publications); Self Care Skills; Severely Handicapped; *Skill Development; Social Behavior; *Trainable Mentally Handicapped; Transfer of Training

ABSTRACT

Provided is a selected review of research on the education and training of the severely to profoundly mentally retarded which was reported in academic and professional publications in the years 1969 - 1975. Sections present bibliographic information and annotations for approximately 164 citations in the following eight research categories (sample subtopics in parentheses): sensori-motor skills, life skills programing (toilet training, grooming, and eating), social behaviors (social responsibility and social interaction), communication skills (operant approaches and precursors of reading skills), descrimination learning (transfer of learning and situational determinants), reduction of undesirable behavior (stereotypies and self-injurious behaviors), conditioning methodology, and assessment. The sections covering each research area are followed by a summary of findings. (IM)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****



The Graduate School and University Center
of the City University of New York

TEACHING RESOURCE CENTER/NEW YORK REGIONAL RESOURCE CENTER
Center for Advanced Study in Education
144 West 125 Street, New York, N.Y. 10027

ED140518

U S DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

PROGRAM PLANNING GUIDELINES:

a review of research with
implications for the education and
training of the severely to profoundly mentally retarded

Martin A. Hayott
Director

Developed under Contract No. OEC-0-74-7895 with the Bureau of Education for the Handicapped, U.S.O.E./D.H.E.W.

CASE - 04 - 76

EC100856

PROGRAM PLANNING GUIDELINES:

a review of research with
implications for the education and
training of the severely to profoundly mentally retarded

Teaching Resource Center
The City University of New York

Prepared by the Staff of the Teaching Resource Center
Winona A. Green, Program Coordinator

Primary Developers - Joseph Perlman
Marvin Stober

Editorial Consultant - Barbara Stasz

The Teaching Resource Center is funded by the Bureau of Education for the Handicapped, Office of Education, U.S. Department of Health, Education and Welfare, Contract No. OEC-0-74-7895. The opinions expressed in this publication do not necessarily reflect the position or policy of the U.S. Office of Education, and no official endorsement by that Office should be inferred.

PROGRAM PLANNING GUIDELINES:

a review of research with
implications for the education and
training of the severely to profoundly mentally retarded

TABLE OF CONTENTS

Topic	Pages
Introduction	1-2
Research Areas	3-6
Sensori-Motor Skills	7-16
Life Skills Programming	17-39
Social Behavior	40-54
Communication Skills	55-75
Discrimination Learning	76-90
Reduction of Undesirable Behavior	91-107
Conditioning Methodology	109-118
Assessment	119-125

INTRODUCTION

The New York Regional Resource Center has as one of its charges the provision of technical assistance to those responsible for the education and training of the severely to profoundly mentally retarded. A first step to meeting the program development needs for this target population is to review related and known efforts. This task has been undertaken by providing those concerned with the education of the target population citation, annotation, review and discussion of reported findings regarding educationally related investigations.

This document was developed to provide readers easy access to investigatory efforts reported in diverse academic and professional publications. It is neither historical in perspective nor representative as an exhaustive search and review. Guidelines for Program Development is a selected review canvassing the years 1969-1975 and addressing categories of research effort focused on:

Sensori-Motor Skills
Life Skills Programming
Social Behavior
Communication Skills
Discrimination Learning
Reduction of Undesirable Behavior
Conditioning Methodology
Assessment

Each of the eight categories exists as a section presenting an expository description of the areas' efforts, citations, salient annotation, synthesizing topical review and discussion of program implications.

It is the sincere hope of the New York Regional Resource Center that this document will facilitate program planners' review, and thus ad hoc knowledge, before program blueprints are drawn.

RESEARCH AREAS

I SENSORI-MOTOR SKILLS: the studies in this section examine the sensori-motor deficits of low functioning children and attempt to devise methods for compensating for these deficits either through overall increases in environmental stimulation, or through training programs which focus on overcoming specific sensori-motor deficits.

II LIFE SKILLS PROGRAMMING: these studies attempt to foster the development of control over the basic life functions such as eating, toileting, and grooming and occasionally attempt to teach prevocational skills.

A. GENERAL PROGRAMS: studies which attempt to train a variety of life skills simultaneously.

B. TOILET TRAINING: studies which attempt to train appropriate toileting behaviors.

C. GROOMING: studies which attempt to train grooming behaviors such as washing, dressing and dental hygiene.

D. EATING - SELF-FEEDING: studies which attempt to train appropriate self-feeding skills such as eating with utensils.

E. EATING - REDUCTION OF EATING DISORDERS: studies which attempt to eliminate eating disorders such as food aversion, overeating, and persistent vomiting.

F. PREVOCATIONAL SKILLS: studies which attempt to train simple assembly tasks in sheltered workshops.

III SOCIAL BEHAVIORS: these studies examine the interpersonal relationships between the low functioning retardate and other individuals with whom he comes in contact (usually other retardates or institutional staff members).

A. SOCIAL RESPONSIVITY: these studies are generally exploratory investigations of the degree to which retardates are responsive to a variety of social stimuli.

B. SOCIAL LEARNING: these are intervention studies which attempt to teach modeling and imitative behaviors.

C. SOCIAL INTERACTION: these are generally intervention studies which attempt to increase the amount of social interaction and foster prosocial behaviors such as cooperative play.

IV COMMUNICATION SKILLS: these studies consist of attempts to provide low level retardates with some form of experience in acquiring communicative symbols.

A. OPERANT APPROACHES - COMPREHENSION: these studies employ operant techniques to train retardates to discriminate between utterances and respond appropriately to simple instructions.

B. OPERANT APPROACHES - PRODUCTION: these studies consist of the employment of operant techniques to promote verbal imitation and labeling behaviors.

C. ALTERNATIVE APPROACHES TO LANGUAGE: these studies employ other theoretical models of language development in order to construct training programs, or attempt to teach alternative communication systems.

D. PRECURSORS OF READING SKILLS: these studies attempt to teach the precursors of reading through discrimination learning tasks.

V DISCRIMINATION LEARNING: these studies employ discrimination learning paradigms in order to investigate deficits in information-processing.

A. TRANSFER OF LEARNING: these studies investigate hypothesized deficits in transfer of learning across contexts and the development of learning sets.

B. OTHER CHARACTERISTICS OF THE LEARNER: these studies investigate other areas of hypothesized deficits such as memory and imagery.

C. SITUATIONAL DETERMINANTS: these studies investigate the effects of stimulus presentation on the discrimination learning of low functioning children.

VI REDUCTION OF UNDERSIRABLE BEHAVIORS: these investigations examine causes, and methods of reduction, of a variety of undesirable behaviors which often interfere with training programs.

A. STEREOTYPIES: these studies focus on the causes and re-

duction of repetitive behaviors such as body rocking.

B. SELF-INJURIOUS BEHAVIORS: these studies focus on the reduction of dangerous, self-mutilative behaviors such as headbanging and voluntary falling.

C. MISCELLANEOUS NEGATIVE BEHAVIORS: these studies consist of attempts to reduce undesirable behaviors as aggression, hyperactivity, and exhibitionism.

VII CONDITIONING METHODOLOGY: these investigations and reviews focus on the effectiveness of conditioning models (or selected aspects of the models) in training severely and profoundly retarded individuals.

A. CONDITIONING MODELS: these studies either explain or assess the effectiveness of operant and classical conditioning procedures in training severely retarded children.

B. REINFORCEMENT: these studies investigate the effectiveness of one or more types of reinforcement, the effects of varying the agents of reinforcements or the effects of varying reinforcement contingencies.

VIII ASSESSMENT: these studies focus on the problems of the assessment of low functioning children, specifically problems with existing testing procedures or the utilization of different instruments for such purposes as diagnosis and programming.

SENSORI - MOTOR SKILLS

Cortazzi, D. The bottom of the barrel. Journal of Mental Subnormality, 1969, 15, 3-10.

A special occupational therapy program was designed for severely and profoundly retarded individuals. The program focused on movement, painting and some cognitive activities. The goal was to enable these individuals to participate in the regular O.T. program. One-third of the subjects were eventually able to participate in the regular O.T. program.

Garcia, R., Cleland, C.C., Rago, W., Wayne, P. & Swartz, J.D. Perception of depth in the profoundly retarded. Bulletin of the Psychonomic Society, 1974, 4, 185-187.

Depth perception of thirty-eight profoundly retarded males was examined using the visual cliff paradigm. Thirty-nine percent of the subjects clearly saw the illusion of depth, thus indicating depth perception.

Hogg, J. & Maier, I. Transfer of operantly conditioned visual fixation in hyperactive severely retarded children. American Journal of Mental Deficiency, 1974, 79, 305-310.

Transfer of operant conditioning of visual fixation was assessed. (See Maier and Hogg, 1974 for initial conditioning). Transfer tasks consisted of (1) a distracting testroom; (2) unconditioned stimuli; (3) experimenter replacement; (4) simple play tasks; (5) formboard; (6) bead

manipulation and (7) classroom tasks. Measures of frequency and duration of fixation indicated consistent improvement for most subjects in the majority of tests.

Luckey, R.E. & Addison, M.R. The profoundly retarded: a new challenge for public education. Education and Training of the Mentally Retarded, 1974, 9, 123-130.

This article presents an overview of training methodology and a large bibliography relevant to program development for the profoundly retarded. Areas for program emphasis are suggested with particular stress on sensori-motor skill development, and the importance of long term training throughout the life cycle.

Maier, I. & Hogg, J. Operant conditioning of sustained visual fixation in hyperactive severely retarded children. American Journal of Mental Deficiency, 1974, 79, 297-304.

Operant procedures were used to increase both frequency and duration of visual fixation of hyperactive severely retarded children. Ten subjects received edible reinforcements for fixating on high and low preference objects in the presence of a variety of distractors. A fixed ratio schedule with three twenty-five percent increments in required duration of fixation was employed.

Miller, M.R., Patton, M.E. & Henton, K.R. Behavior modification in a profoundly retarded child: a case report. Behavior Therapy, 1971, 2, 375-384.

Operant procedures were used to modify three behaviors of a profoundly retarded boy: self-feeding, appropriate response to a verbal command, and the ability to stand without support. Positive side effects such as a greater responsiveness to his environment and an increase in independent mobility were also noted.

Norton, Y. Neurodevelopment and sensory integration for the profoundly retarded multiply handicapped child. American Journal of Occupational Therapy, 1975, 29, 93-100.

Three profoundly retarded multiply handicapped children received a mother-administered, clinic-supervised treatment program for neurodevelopmental sensory integration. Neurodevelopmental training consists of special methods for handling the child in order to provide the sensation of normal movement and inhibit abnormal gross motor patterns. Sensory integration training consists of controlling sensory input in order to improve the organization of CNS mechanisms. After nine months of intensive treatment, postural, perceptual, emotional and cognitive changes were noted.

O'Brien, F., Azrin, N.H. & Bugle, C. Training profoundly retarded children to stop crawling. Journal of Applied Behavior Analysis, 1972, 5, 131-137.

Procedures were developed for reducing crawling and rewarding walking behavior of profound retardates. Although both behaviors were in the subjects' repertoires, the subjects had handicaps which made crawling

the easier and preferred response. Procedures consisted of a combination of edible and social reinforcements for walking, restraint for crawling and priming of walking. Follow-up indicated that moderately impaired subjects maintained the walking behaviors, while severely impaired subjects occassionally required a reinstitution of restraint procedures in order to maintain walking as the dominant mode of locomotion.

Rowe, D. The effect of a more stimulating environment on the behavior of a group of severely subnormal adults. British Journal of Mental Subnormality, 1974, 20, 6-13.

Twenty-one severely and profoundly retarded adults participated in a stimulation enrichment program which consisted of motor skill training, physiotherapy, art therapy, field trips, games and self-help skills. Results indicated improvements in sensori-motor development, circular reactions, and object permanence.

Sternlicht, M., Siegel, L., & Deutsch, M. Evaluation of a remotivation program with institutionalized mentally retarded youngsters. Training School Bulletin, 1971, 68, 82-86.

A remotivation program was developed in order to stimulate the interest of low functioning children in their social and physical environment. Subjects were seated in a circle and motivator-attendants attempted to stimulate interest through the extensive use of props. Significant improvement on subsections of the Behavior Rating Scale were reported.

Areas of improvement were sociability, alertness, and responsiveness to the environment. Improvements in staff morale were also noted.

Sullivan, J.P. & Batarseh, G.J. Educational therapy with the severely retarded. Training School Bulletin, 1973, 70, 5-9.

Thirty low functioning children were divided into ability groups and received (1) gross and fine motor skill training, (2) visual and auditory perceptual skill training, and (3) some language training. Results indicated improvement in motor and language skills, and some transfer to self-care skills and socialization.

Webb, R. Sensory-motor training of the profoundly retarded. American Journal of Mental Deficiency, 1969, 74, 283-295.

A sensori-motor training program was developed for use with profoundly retarded individuals. The goal of the program was (1) to develop single attentional and motor reactions to discrete stimuli and (2) to integrate these responses into multiple sensori-motor units. The program focused on increasing sensory awareness, improving motor movements, developing posture and locomotion, and improving object manipulation skills. Clinical assessments of pre-post treatment differences were more sensitive measures of sensori-motor skill improvement than statistical comparisons of standardized test scores.

Wohlhueter, M.J. & Sindberg, R.M. Longitudinal development of object permanence in mentally retarded children. American Journal of Mental Deficiency, 1975, 79, 513-518.

This study consists of a longitudinal investigation of the development of object permanence in moderately to profoundly retarded children. Subjects were tested monthly up to a period of one year or until criterion performance was demonstrated. Three distinct patterns emerged among subjects who did not reach criterion: (1) little change in level of performance across testings; (2) variable performance across testings indicating upward and downward movement; (3) overall upward trend with some plateaus and some reversals. Factors such as severity of retardation, C.A. and evidence of brain damage appeared to have some influence on the development of object permanence.

SUMMARY

Descriptive research on sensori-motor development (Wohlhueter & Sindberg, 1975; Garcia, et al, 1974) indicates that wide individual differences exist in severe to profound levels of retardation in terms of degree of sensori-motor development. This would imply that a necessary pre-requisite to sensori-motor training is a diagnostic assessment of the individual's current level of functioning.

There is some evidence that this low level of functioning might be maintained by a stimulus deprived environment, thus several stimulus enrichment programs have reported improvement in sensori-motor skills (Cortazzi, 1969, Rowe, 1974; Sternlicht, et al, 1971).

Operant conditioning procedures have yielded some success in modifying certain specific skills such as visual fixation (Hogg & Maier, 1974; Maier & Hogg, 1974) standing (Miller et al, 1971) and walking (O'Brien, et al, 1972). However, O'Brien, et al, (1972) offer evidence that the degree of success may also be a function of the severity of the learner's initial impairment.

Another approach to sensori-motor training consists of breaking down sensori-motor development into specific sensori- and motor reactions to discrete stimuli, then focusing on the integration of these reactions (Webb, 1969; Norton, 1975).

According to Piagetian theory sensori-motor development is a

necessary precursor of all further intellectual development. Some evidence (see Language Skills, Kahn, 1975) exists that supports the hypothesis that Piaget's stage 6 of sensori-motor development is a necessary pre-requisite for the onset of language. Gross and fine motor skills are already recognized as important pre-requisites for basic life skill training such as dressing and eating.

Sensori-motor skills probably provide a necessary foundation for further training in many areas. It would seem that any training program would do well to initially test its potential trainees to determine their entering level of sensori-motor development. Procedures for overcoming specific sensori-motor deficits which would be necessary for successful training, could then be developed and incorporated into existing programs. The two current approaches to overcoming sensori-motor deficits are (1) general stimulus enrichment programs; and (2) programs which carefully control and regulate stimulus input so that sensori-motor integration is gradually established. One can speculate that programs of the former type might be more effective with the higher functioning members of this population, while the lowest level retardates may require more carefully constructed programs. Further research in this area is required in order to answer such questions as which type of program would best benefit any particular individual in the target population.

Investigatory effort on the sensory-motor skills of the severely and profoundly mentally retarded point toward particular program priorities. Firstly, in order for programming in this skill area to be developed within a logical framework it must be individualized. Individualizing can only happen if adequate assessment information is available. Assessment must differentiate interindividual differences while at the same time tapping intraindividual differences. Secondly, a determination will have to be made as to the primary focus of program efforts. An exogenous approach will look toward change in the environment as the crux of intervention. Stimulus enrichment programs are indicated when the individual is assessed to be responding in simple accordance with inherent environmental demands. An endogenous approach will look toward a change in the individual as the thrust of intervention effort. Such individualized programs which are based on intraindividual differences are indicated when the environment offers greater sensory stimulation than that to which the individual responds.

It must be recognized that a certain level of sensori-motor skill is an essential prerequisite to success in other skill areas typically included in curricula for the severely and profoundly mentally retarded. Sensori-motor skill training is a first level skill area from which language and basic life skills training follow. The pace of sensori-motor training programs should be tied to the level of assessed sensori-motor disability of the individual. As a rule of thumb the greater the disability the longer and the more discrete the training to reach specified objectives.

LIFE SKILLS TRAINING

21

GENERAL PROGRAMS

Colwell, C.N., Richards, E., McCarver, R.B. & Ellis, N.R. Evaluation of self-help habit training of the profoundly retarded. Mental Retardation, 1973, 11, 14-18.

This article presents the results of an evaluation of a short term institution which focuses on intensive training of self-help skills such as toileting, feeding, and dressing. A comparison of pre- and post-test scores of forty-seven subjects indicated significant gains in mental age, as well as significant gains in self-help skills.

Leath, J.R. & Flournoy, R.L. Three year follow-up of intensive habit-training program. Mental Retardation, 1970, 8, 32-34.

This article presents the results of a three year follow-up examination of the effects of an intensive habit training program for the severely and profoundly retarded. Results indicated that the significant gains produced by the program were maintained, but there was no significant increase in gains since the initial evaluation.

Musick, J.K. & Luckey, R.E. Program profiles: a token economy for moderately and severely retarded. Mental Retardation, 1970, 8, 35-36.

A token economy was established in order to encourage a variety of behaviors such as participation in groups, grooming skills, and dormitory chore performance. The subjects were moderately and severely

retarded individuals. Increases in all desirable behaviors except volunteering for part-time work were noted. Concurrently an 80% decrease in undesirable behaviors such as aggression was also noted.

Azrin, N.H. Bugle, C. & O'Brien, F. Behavioral engineering: two apparatuses for toilet training retarded children. Journal of Applied Behavior Analysis, 1971, 4, 249-253.

This study tested the effectiveness of two electronic devices for toilet training. The first was a pants alarm system worn by the subject which signaled the onset of urination. The second was a toilet signal device which signaled proper urination in the commode. Four profoundly retarded children were trained using these devices. The advantages were: (1) automatic monitoring of the child's behavior; (2) immediate delivery of reinforcement; (3) reliability of reinforcement; and (4) low cost.

Azrin, N.H. & Foxx, R.M. A rapid method of toilet training the institutionalized retarded. Journal of Applied Behavior Analysis, 1971, 4, 89-99.

Two electronic devices were used to toilet train nine profoundly retarded adults in combination with operant shaping procedures, and a ward maintenance program. Dressing and undressing skills were shaped, and prompting and fading were used to teach the subjects to initiate toileting. The results of the training were maintained over a five month period.

Hereford, S.M. Cleland, C.C. & Fellner, M. Territoriality and scent-

marking: A study of profoundly retarded enuretics and encopretics. American Journal of Mental Deficiency, 1973, 77, 426-430.

This study hypothesized that nocturnal enuretic and encopretic behaviors are primitive territorial defenses. Environmental charges were made to reduce crowding and divide the sleeping quarters with highly visible boundary lines. Although both changes resulted in a decrease in nocturnal enuretic and encopretic behaviors, there was little increase in these behaviors when the changes were removed.

Levine, M.N. & Elliot, C.B. Toilet training for profoundly retarded with a limited staff. Mental Retardation, 1970, 8, 48-50.

Operant shaping procedures were used to toilet train 103 profoundly retarded subjects. The program consisted of reinforcement for successive approximations of the desired behaviors. Although instances of accidental defecation still occurred, they were reduced by 59%.

Mahoney, K., Van Wagenen, R.K. & Meyerson, L. Toilet training of normal and retarded children. Journal of Applied Behavior Analysis, 1971, 4, 173-181.

An appropriate chain of toileting behaviors was taught to retarded and normal children. Initially the responses were obtained by a combination of physical, verbal and auditory prompts. Then the physical and verbal prompts were faded until the learners responsed to the auditory prompt-a mechanical signaling device. Finally auditory prompting was

also discontinued. A profoundly retarded subject demonstrated appropriate toileting behaviors when all prompts were removed. However, the behaviors were not maintained because the parents persisted in prompting the child.

Osarchuk, M. Operant methods of toilet-behavior training of the severely and profoundly retarded: a review. Journal of Special Education, 1973, 7, 423-437.

This article is a comprehensive review of toilet training studies, beginning with Ellis' operant model of toileting behavior and the research which is derived from it through research on the application of mechanical devices. Three conslusions were drawn: (1) mechanical devices seem to yield more behavior maintenance than strict operant procedures; (2) the ability to be trained may be predicted from both MA and CA; and (3) little research has been done which compares the relative effectiveness of operant and other procedures.

Rentfrow, R.K. & Rentfrow, D.K. Studies related to toilet training of the mentally retarded. American Journal of Occupational Therapy, 1969, 23, 425-430.

This review summarizes the effects of seven toilet training studies which report significant improvement in appropriate toileting behavior. In all of the training procedures the subjects were placed in small groups with high attendant: patient ratios. The reduced stimulation and focusing of the subjects attention might explain the improvement.

In general, subjects usually regressed when they returned to their old environment. The review implies that changes must be made either (1) in the everyday environments themselves, or (2) in developing training procedures which foster the maintenance of appropriate toileting behaviors.

Van Wagenen, R.K., Meyerson, L., Kerr, N.J. & Mahoney, K. Field trials of a new procedure for toilet training. Journal of Experimental Child Psychology, 1969, 8, 147-159.

Nine profoundly retarded subjects wore an auditory signaling device which indicated the onset of urination. When the device was sounded, the subject was placed on the toilet and urination was reinitiated. Removal of clothing was also shaped. The appropriate behaviors were maintained by subjects (1) whose caretakers "expected" the appropriate behaviors, and (2) who were allowed free access to toilet facilities.

Watson, Jr., L.S. Applications of behavior - shaping devices to training severely and profoundly mentally retarded children in an institutional setting. Mental Retardation, 1968, 6, 21-23.

A special electronic device was field tested with eight low functioning subjects. The device was a special toilet which automatically dispensed reinforcement when something was placed in it. Five of the subjects used it successfully, two were never aware of the reinforcement, and one found it aversive. The device has two advantages: (1) it does not require attendants well trained in operant procedures, and (2) it does not require a low patient: staff ratio.

GROOMING

Abramson, E.E., & Wunderlich, R.A. Dental hygiene training for retardates: an application of behavioral techniques. Mental Retardation, 1972, 10, 6-8.

A program was devised to teach severely retarded children to brush their teeth without assistance. Phase I consisted of teaching subjects to discriminate which box contained their own brushing kit. Phase II consisted of learning to apply paste to the brush. Phase III involved transfer of the previously learned behaviors to the appropriate setting plus the appropriate brushing technique. A pre- posttest comparison indicated a highly significant improvement in checklist score.

Ball, T.S., Seric, K. & Payne, L.E. Long-term retention of self help skill training in the profoundly retarded. American Journal of Mental Deficiency, 1971, 76, 378-382.

This study presents the results of a four year follow-up of an intensive self help training program. Results indicated that while undressing skills decreased after training, dressing skills increased. The results were interpreted as indicating that the dressing situation is easier because it provides learners with a non-verbal cue - the subject is handed the object to be put on.

Martin, G.L., Kehoe, B., Bird, E., Jensen, V. & Derbyshire, M. Operant conditioning in dressing behavior of severely retarded girls. Mental Retardation, 1971, 9, 27-31.

An operant program was devised to teach dressing skills to eleven severely retarded girls. A combination of positive reinforcement, time out, and negative reinforcement procedures were used. One article of clothing was learned at a time, and subjects were taught to discriminate the outside of an article of clothing from the inside. Improvement in dressing skills was noted and there was some generalization to the ward setting.

Treffrey, D., Martin, G., Samuels, J. & Watson, C. Operant conditioning of grooming behavior of severely retarded girls. Mental Retardation, 1970, 8, 29-33.

Eleven severely retarded females were trained to wash and dry their face and hands. The program consisted of a twelve step procedure which was taught one step at a time using prompting and fading in combination with positive reinforcement. In nine weeks seven of the eleven subjects could wash themselves without assistance.

SELF - FEEDING

Azrin, N.H. & Armstrong, P.M. The "mini meal": a method for teaching eating skills to the profoundly retarded. Mental Retardation, 1973, 11, 9-13.

Eleven profoundly retarded subjects were taught to eat with utensils through a combination of manual guidance, social reinforcement, and time out procedures. Each of the three daily meals was subdivided into 3 meals so the subjects had nine short mini lessons throughout the day rather than three long ones. A significant reduction in inappropriate eating behaviors compared with the control group was noted, and this reduction was maintained in a twenty-eight week follow-up evaluation.

Berkowitz, S., Sherry, P.J. & Davis, B.A. Teaching self-feeding skills to profound retardates using reinforcement and fading procedures. Behavior Therapy, 1971, 2, 62-67.

A seven step sequence was devised to teach fourteen profoundly retarded boys to eat with a spoon. Initially the experimenter manually guided the subject through the entire sequence. Gradually the guidance was faded. All subjects learned to eat with a spoon and a 41 month follow-up indicated the behavior was maintained.

Christian, W.P., Holloman, S.W. & Lanier, C.L. An attendant operated feeding program for severely and profoundly retarded females. Mental Retardation, 1973, 11, 35-37.

Severely and profoundly retarded females were instructed to eat with a spoon. Time out procedures (tray removal) followed any inappropriate behavior. The subjects were placed into groups with varying staff: patient ratios depending on the subject's level of inappropriate behaviors. A large decrease in inappropriate eating behaviors was reported.

Groves, I.D. & Carroccio, D.F. A self-feeding program for the severely and profoundly retarded. Mental Retardation, 1971, 9, 10-12.

Twenty-four low functioning subjects were taught to eat with a spoon. Time out for inappropriate responses was used, and if a subject made an excessive number of inappropriate responses the meal was terminated. Gradually the criterion for termination was reduced to two inappropriate responses and a decrease in inappropriate responses was reported. A one year follow-up indicated the results were maintained.

Lemke, H. & Mitchell, R.D. Controlling the behavior of a profoundly retarded child. The American Journal of Occupational Therapy, 1972, 26, 261-264.

A profoundly retarded child was taught appropriate self-feeding behavior. Gradual shaping procedures were accompanied by time out for incompatible responses. Once appropriate behaviors were instituted, the presence of the therapist was gradually withdrawn. An eighteen month follow-up indicated the appropriate behaviors were maintained.

Martin, G.L., McDonald, S. & Omichinski, M. An operant analysis of response interactions during meals with severely retarded girls. American Journal of Mental Deficiency, 1971, 76, 68-75.

Two operant procedures were used in order to eliminate improper meal time behaviors of four severely retarded females. Social reinforcement for incompatible responses (proper meal time behaviors) was ineffective in reducing the undesirable behaviors. Time out for undesirable behaviors was effective, but initially produced a temporary increase in another class of undesirable behaviors.

O'Brien, F., Bugle, C. & Azrin, N.H. Training and maintaining a retarded child's proper eating. Journal of Applied Behavior Analysis, 1972, 5, 67-72.

A profoundly retarded girl was taught to eat with a spoon. The sequence was divided into six steps. Neither manual guidance procedures, nor motivation techniques (tray removal) alone were effective in training the behavior but were required in combination. Motivation through tray removal was required to maintain proper eating behavior.

Song, A.Y. & Gandhi, R. An analysis of behavior during the acquisition and maintenance phases of self-spoon feeding skills of profound retardates. Mental Retardation, 1974, 12, 25-28.

Three profoundly retarded males were taught to eat with a spoon. A seven step procedure was used which included social reinforcement, time out, and physical prompting and fading.

EATING DISORDERS

Ausman, J., Ball, T.S. & Alexander, D. Behavior therapy of pica with a profoundly retarded adolescent. Mental Retardation, 1974, 12, 16-18.

An intensive behavior modification program was developed to eliminate pica in a severely retarded boy. During phase one the subject was taught to discriminate between edibles and non-edibles using a combination of time out and positive reinforcement procedures. Generalization training consisted of three phases. Training procedures were continued in diverse settings with a variety of non-edible objects. A nine month follow-up indicated that a high degree of control over the pica behavior was maintained.

Carson, P. & Morgan, S.B. Behavior modification of food aversion in a profoundly retarded female: a case study. Psychological Reports, 1974, 34, 954.

A seventeen year old profoundly retarded female was treated for anorexia. It was necessary to find a reinforcing object since edibles were ineffective. Ringing a bell served as the positive reinforcer and it was used to shape drinking from a bottle. Gradually a normal diet was instituted.

Foreyt, J.P. & Parks, J.T. Behavioral controls for achieving weight loss in the severely retarded. Journal of Behavior Therapy and Experimental Psychiatry, 1975, 6, 27-29.

A program was devised to effect weight loss in three severely retarded women who attended a day care center. The program consisted of (1) a manual for parents, (2) token reinforcement, (3) monetary reinforcement, (4) daily weighings. The goal of significant weight reduction was achieved, and the results of a 29 week follow-up indicated that the reduction was maintained.

Jackson, G.M., Johnson, C.R., Ackron, G.S. & Crowley, R. Food satiation as a procedure to decelerate vomiting. American Journal of Mental Deficiency, 1975, 80, 223-227.

A satiation procedure was used to reduce instances of chronic rumination and regurgitation in two profound retardates. It was hypothesized that the reconsumption of vomit was the reinforcing consequence of the vomit-ruminate chain. Therefore an excessive amount of the reinforcer (food) would result in a decrease in the undesirable behavior. Results confirmed the hypothesis.

Kohlenberg, R.J. The punishment of persistent vomiting: a case study. Journal of Applied Behavior Analysis, 1970, 3, 241-245.

A severely retarded female was treated for chronic vomiting by applying electric shock contingent on signals of stomach tension which indicated that the subject was about to vomit. Although the procedure succeeded in eliminating vomiting during training, a one year follow-up indicated that the results were not maintained.

Smeets, P.M. Withdrawal of social reinforcers as a means of controlling rumination and regurgitation in a profoundly retarded person. Training School Bulletin, 1970, 67, 158-163.

Instances of chronic rumination and regurgitation were reduced in a profoundly retarded male through a combination of time out and positive reinforcement procedures. Initially a favored food was used as positive reinforcement but after 5 weeks social reinforcements were substituted.

Bateman, S. Application of Premack's generalization on reinforcement to modify occupational behavior in two severely retarded individuals. American Journal of Mental Deficiency, 1975, 79, 604-610.

Two severely retarded subjects were employed in this study. They were allowed to perform a preferred activity only if they spent some time on a less preferred activity. This resulted in an increase in time spent on the less preferred activity. When the contingency was reversed, the subjects still spent some on the less preferred activity.

Gold, M.W. Stimulus factors in skill training of retarded adolescents on a complex assembly task: acquisition, transfer and retention. American Journal of Mental Deficiency, 1972, 76, 517-526.

Subjects were trained on a coaster brake assembly task. The task required the assembly of fifteen parts. Half of the group were trained with color coded parts, while the rest were trained with the parts as they were produced in the factory. Half of each group learned the task to a criterion while the other half had 20 additional trials beyond the criterion (over-learning). The color coded group learned the task significantly faster than the no code group. Overlearning had no significant effect on the rate of acquisition of a transfer task. A one year follow-up indicated considerable retention without the

opportunity for practice.

Gold, M.W. & Barclay, C.R. The learning of difficult visual discriminations by the moderately and severely retarded. Mental Retardation, 1973, 11, 9-11. (a)

This study compared the relative effectiveness of two procedures for teaching a difficult discrimination task to low functioning individuals. The task consisted of sorting bolts which differed only in length. One procedure consisted of teaching the task in three stages with an increasingly difficult discrimination in each stage. The other procedure consisted of teaching the difficult discrimination from the beginning of training. Results indicated a significant difference between groups. Subjects in the graduated learning group learned the difficult discrimination, while subjects in the other group did not. When the non-learners were retrained using graduated procedures, all except two learned the discrimination.

Gold, M.W. & Barclay, C.R. The effects of verbal labels on the acquisition and retention of a complex assembly task. Training School Bulletin, 1973, 70, 38-42. (b)

Fourteen moderately and severely retarded subjects were taught a twelve piece brake assembly task. One group received verbal labeling and cues during training, the other received only knowledge of results (correct-incorrect). Performance of the verbal cue group was superior to that of the no verbal cue group. Evidence of retention was reported for

both groups after a six month no practice interval.

Karen, R.K., Eisner, M. & Endres, R.W. Behavior modification in a sheltered workshop for severely retarded students. American Journal of Mental Deficiency, 1974, 79, 338-347.

Ten severely retarded adolescents were taught to transform gallon food cans into nursery specimen cans. The task required a sequence of five skills. The skills were taught in a sheltered workshop which employed a token economy and time out procedures.

SUMMARY

The research on general life skills training programs offers some evidence that these intensive programs can produce significant improvements in a variety of areas (Colwell, et al, 1973; Leath & Flournay, 1970; and Musick & Luckey, 1970). Furthermore there is one report (Leath & Flournay, 1970) which indicates that these improvements can be maintained over a period of several years.

With one exception (Hereford, Cleland & Fellner, 1973), research specifically on toilet training has focused on the use of operant techniques in order to teach appropriate toileting behaviors. The current trend in this literature is the addition of inexpensive mechanical signal and reinforcement dispensing devices. These devices have the following advantages: (1) they do not require a low patient: staff ratio since the children's behavior is monitored automatically; (2) they ensure the immediate and consistent delivery of reinforcement following appropriate responses.

These devices function in conjunction with operant programs which break down toileting behaviors into a chain of responses beginning with a response to the signal prompt, walking to the toilet, undressing, eliminating (with automatic dispensing of reinforcement) then dressing. Gradually the use of the auditory prompt and reinforcement is faded. The chief problem has been the maintenance of these behaviors when the children have returned to their usual wards. Two of the chief problems

have been the lack of free access to toilet facilities, and interference by inappropriate prompting from parents and staff, once the automatic prompting has been removed.

Hereford, et al, (1973) have proposed an alternative explanation for lack of appropriate toileting behavior in the institutional environment. They posit that nocturnal enuretic and encopretic behaviors are primitive territorial defenses in reponse to crowded conditions. According to this thesis, long term maintenance of appropriate toileting behaviors would require environmental changes to eliminate crowding, but the results at the moment are inconclusive, and further research in this area is necessary.

Results of research on grooming skills indicate that operant procedures have resulted in improvements in dental hygiene (Abramson & Wunderlich, 1972), dressing and undressing (Ball, et al, 1971; Martin, et al, 1971), and washing (Treffrey, et al, 1971). The general procedures consist of breaking down the behaviors into a sequence of steps which consist of teaching the appropriate discriminations and motor skills. Then these steps are taught in sequence with motor prompting which is gradually faded in the course of training. Generally, positive reinforcement in the form of edibles and time out for undesirable behavior are employed. Results seem to indicate that if the desired behaviors are to transfer to the ward setting, some transfer procedures must be incorporated into the training programs. To date there has been little research which examines the length of time these behaviors

are maintained in the ward setting. Finally, there is some evidence (Ball, et al, 1971) that if the discriminations and behaviors required are difficult, the addition of nonverbal cues may facilitate the learning.

Operant procedures have been successfully used to shape appropriate self-feeding behaviors of severely and profoundly retarded children. Successful programs have two focuses: (1) teaching the necessary motor movements required and (2) instilling motivation to learn the desired responses. Motor movements are shaped by breaking down the behaviors into steps and using prompting and fading procedures which consist of initially manually guiding the learner through the sequence, and gradually omitting the guidance. Motivation to emit the desired responses is achieved through the use of time out procedures which involve removing the tray for a short period of time contingent upon the occurrence of any undesirable behavior.

Inappropriate eating behaviors consist of a wide range of behaviors from pica (persistent attempts to eat inedible objects) and overeating, to food aversion and chronic regurgitation and rumination. The general approach to reducing these behaviors has been to employ some form of reinforcement with procedures appropriate to the reduction of the particular behavior disorder. For example, pica training focuses on teaching discrimination between edible and inedible objects (Ausman, et al, 1974). Food aversion has been eliminated by finding a non-edible object which has reinforcement value for the subject, and presenting the object contingent upon eating (Carson & Morgan, 1974).

A variety of approaches have been used to eliminate chronic regurgitation and rumination. Punishment (Kohlenberg, 1970) and time out procedures (Smeets, 1970) were initally effective in eliminating these behaviors. A new satiation procedure (Jackson, et al, 1975) interprets feconsumption of vomit as a positive reinforcer of vomiting and employs food satiation in order to decrease vomiting. Presently, however, whether or not any of these procedures result in long term maintenance of the reduction of the undesirable behaviors is an open question.

Preliminary studies of pre-vocational skill training have indicated some success in teaching higher level severely retarded individuals to perform assembly (Gold, 1972; Gold & Barclay, 1973 (a), (b)) and other tasks (Karen, et al, 1974). In general, special training procedures must be utilized, such as increasing the discriminability between the parts to be assembled through color coding or labeling, or teaching difficult discriminations in a series of graduated stages. These studies also report that once the task is learned, the learning is retained for long periods, even without opportunity to practice the skills.

In conclusion, most of the research in the area of life skill training has employed principles of operant conditioning in order to construct training programs specifically geared to the severely and profoundly retarded. These programs consist of breaking down the desired behaviors into a chain of responses which are gradually acquired. Considerable success has been reported in this area. Often

during training the learners are placed on special wards in order to minimize distractions and interference from other staff. The major source of difficulty with these programs has been maintaining the new repertoire of behaviors once the learners return to their regular ward. Programs which have either specifically incorporated transfer and maintenance procedures or have taken place in the regular ward setting have, in general, had the most success in maintaining these new behavior repertoires. Future attempts to implement these training programs might do well to initially observe the institutional environment before initiating training in order to determine whether or not changes either in staff-patient interactions or environmental conditions would be required for successful maintenance of the behaviors learned in these training programs.

The major implication to be drawn in the area of life skills training is that a task analysis approach to curriculum appears successful. Since there is indication that skills mastered may be situation specific, (not transferring to the "regular" living situation), training context is also of prime importance for long term success.

SOCIAL BEHAVIORS

SOCIAL RESPONSIVITY

Altman, R., Cleland, C.C. & Swartz, J.D., Social responsivity in the profoundly mentally retarded. Perceptual and Motor Skills, 1972, 34, 101-102.

Two experimenters approached twenty-six profoundly retarded males and attempted to initiate handshakes. Handshakes were obtained from twenty of the subjects. Besides a measure of social responsivity, handshaking may be a method for gauging right or left handedness in profound retardates.

Altman, R. Swartz, J.D. & Cleland C.C. Differential sensitivity of profound retardates to adults' steady gaze. Psychological Reports 1970, 27, 30.

Ten profoundly retarded males were gazed at by an experimenter under several conditions. All subjects responded to the gaze either with approach or withdrawal behaviors. A high degree of intra-subject consistency was noted.

Cleland, C., Altman, R. & Swartz, J.D. Dominance-submission in profoundly retarded male subjects under conditions of strong motivation. Journal of Psychology, 1971, 78, 185-191.

Twenty-six profoundly retarded males were approached twice by the experimenters. The manner of approach was either aggressive or non-aggressive and the order was counterbalanced. The majority of subjects

responded with submissive gestures in both situations, and a high degree of intra-subject consistency across situations was noted.

Cleland, C.C., Hereford, S. McF., Fellner, M. & Lawrence, W. Parental behaviors in profoundly retarded subjects. Perceptual and Motor Skills, 1973, 36, 215-218.

Twenty-nine profoundly retarded adults viewed an infant under both individual and group viewing situations. Significantly more females actively approached the infant than the males did. Peer presence was found to have little effect on viewing responses. The approach behavior was interpreted as curiosity rather than instinctual parental behavior.

Jackson, E.D. & Jackson, R.L. Distribution of rewards by mentally retarded individuals in a cost and no-cost situation. American Journal of Mental Deficiency, 1974, 79, 77-82.

Fifty severely retarded males of five MA levels were asked to distribute rewards under two conditions. Under the no-cost condition, the subject divided the rewards between two boys, while under the cost condition the subject divided rewards between himself and another who did more work. The task proved too difficult for the two lowest MA levels, but subjects in the higher MA groups distributed rewards equitably according to the amount of work done, even in the cost situation.

Pechacek, T.F., Bell, K.F., Cleland, C.C., Baum, C. & Boyle, M. Self-recognition in profoundly retarded males. Bulletin of the Psychonomic Society, 1973, 1, 328-330.

Two studies were reported which examine self-recognition behavior in profoundly retarded adults. Two mirror training procedures failed to yield results which would unequivocally indicate that these adults had developed self-recognition. In contrast, self-recognition develops in normal infants around 7 months of age and is easily established in chimpanzees. The authors concluded that early experience with mirrors or longer training sessions may be necessary pre-requisites for self-recognition.

Altman, R., Talkington, L.W. & Cleland, C.C. Relative effectiveness of modeling and verbal instructions on severe retardates' gross motor performance. Psychological Reports, 1972, 31, 695-698.

Forty-five severely retarded males were divided into three groups. One group received verbal instructions in an attempt to elicit several simple gross motor behaviors. The second group saw a model perform the behaviors, and the third group served as the control. No differences were found between the three groups on performance of the desired behaviors. The results indicated that these individuals neither responded to the verbal instructions nor spontaneously modeled the behaviors.

Bandura, A. & Barab, P.G. Conditions governing non-reinforced imitation. Developmental Psychology, 1971, 5, 244-255.

This study examined two contradictory explanations for the occurrence of imitative responses which are not explicitly reinforced. According to the conditioned reinforcement hypothesis, if reinforcement of accurate imitations are reinforced, the act of imitation itself acquires conditioned reinforcement properties. According to the discrimination hypothesis, non-rewarded imitations occur because the subjects fail to discriminate the differential reinforcement contigency. Results of the study supported the discrimination hypothesis since the subjects continued to perform nonreinforced imitations which were difficult to

distinguish from reinforced imitations, but discontinued nonreinforced imitations that were easily distinguishable.

Bitcon, C.H. & Ball, T.S. Generalized imitation and Orff-Schulwerk. Mental Retardation, 1974, 12, 36-39.

This study examined the effectiveness of the Orff-Schulwerk method in developing generalized imitation in low functioning children. The method consists of group activities in which a rhythmn of imitative movements is established. Results indicated some differences in generalized imitation compared to a control group but the size of effect was not great enough to warrant use of the method alone. The investigators concluded that it might be more effective in combination with other procedures.

Bry, P.M. & Nawas, M.M. Is reinforcement necessary for the development of a generalized imitation operant in severely and profoundly retarded children? American Journal of Mental Deficiency, 1972, 76, 658-667.

This study attempted to determine whether or not a generalized imitative operant could be developed without external reinforcement. Two severely retarded children served as the subjects. Initially one subject received reinforcement for imitation, followed by an extinction of the response. Finally imitation was reinstated by reinforcement procedures. Results indicated that external reinforcement was necessary for the development of imitative behavior. These results were replicated in a study which employed two profoundly retarded children as subjects.

Bucher, B. & Bowman, E.A. The effects of a discriminative cue and an incompatible activity on generalized imitation. Journal of Experimental Child Psychology, 1974, 18, 22-33.

Four severely retarded males were trained to imitate a variety of simple behaviors. Following the pretraining the subjects received imitation tasks under three conditions: (1) the imitation task was presented while an alternative task was present on a table near the subject; (2) the subject received a series of imitation tasks and was cued as to which tasks would be reinforced; (3) both alternative tasks and cues were presented. Results indicated that the greatest discrimination between tasks which would be reinforced occurred under condition (3); and that imitation of nonreinforced cues varies with the degree to which reinforcement is available for the other activity. This suggests that if one wants to develop a generalized response one must (1) make it difficult for the learner to discriminate between reinforced and nonreinforced problems; and (2) make the cost for imitating new responses low.

Garcia, E., Baer, D. M. & Firestone, I. The development of generalized imitation within topographically determined boundaries. Journal of Applied Behavior Analysis, 1971, 4, 101-112.

Four severe retardates were trained to imitate three types of behaviors through shaping and fading procedures. During the course of training, probes tested generalization of imitation to new behaviors. Results indicated that generalization occurred to new behaviors of the same

type that were being trained, or had been previously trained, but not to new classes of behaviors.

Martin, J.A. The effect of incongruent instructions and consequences on imitation in retarded children. Journal of Applied Behavior Analysis, 1972, 5, 467-475.

A thirteen phase experiment employed three severely retarded boys as subjects. In several phases there was a lack of congruence between the experimenter's instructions and the consequences for imitation. Consequences rather than instructions controlled imitative behavior under the following conditions: (1) subjects were instructed not to imitate, but imitation resulted in positive reinforcement; (2) subjects were instructed to imitate, but were differentially reinforce for other behavior; and (3) subjects were instructed to imitate but received negative reinforcement for imitation. When instructions and consequences were congruent it is unclear which factor(s) controls imitative responses.

SOCIAL BEHAVIOR-INTERACTION

Guralnick, M.J. & Kravik, M.A. Reinforcement procedures and social behavior in a group context with severely retarded children. Psychological Reports, 1973, 32, 295-301

Social reinforcement contingent upon pro-social behaviors with peers was ineffective in eliciting the desired behaviors. Edible reforcement did result in an increase in pro-social behaviors, particularly non-aggressive physical contact, but there was little generalization to other free play situations.

Morris, R.J. & Dolker, M. Developing cooperative play in socially withdrawn retarded children. Mental Retardation, 1974, 12, 24-27

A combination of modeling and reinforcement procedures were used to develop cooperative play in severely retarded children. Subjects were divided into pairs and received candy and praise for rolling a ball back and forth. Pairs consisting of a high interactive and low interactive subject were effective in eliciting the appropriate response from low interactive subjects. Pairs consisting of two low interactive subjects did not elicit increases in appropriate responses.

Paloutzian, R.F., Hasazi, J., Striefel, J. & Edgar, C.L. Promotion of positive social interaction in severely retarded young children. American Journal of Mental Deficiency, 1971, 75, 519-524.

Ten severely retarded children received imitation training consisting of modeling of both motor behaviors and social interaction behaviors. Pre- and posttest scores on the Social Interaction Rating Scale indicated a significant improvement in level of social behavior. This change generalized to the ward setting. In contrast, a control group showed no improvement in level of social behavior.

Redd, W.H. Effects of mixed reinforcement contingencies and adults' control of children's behavior. Journal of Applied Behavior Analysis, 1969, 2, 249-254

Two severely retarded boys, each a member of a different play group, received contingent, non-contingent or a combination of contingent and non-contingent reinforcement from adults for cooperative play. The children reacted to the adults in a manner consistent with how these adults had reinforced past behavior. The entrance of the contingent reinforcing agent provoked cooperative play behavior while the entrance of the non-contingent reinforcing agent did not. The entrance of the agent who reinforced under a mixed contingency provoked some cooperative play behavior but not as much as the contingent agent. This implies that if one wants to bring a particular behavior under the control of reinforcement, the reinforcement must be contingent and consistent.

Redd, W.H., Generalization of adult's stimulus control of children's behavior. Journal of Experimental Child Psychology, 1970, 9, 286-296.

Four severely retarded boys, each a member of different play group, received either contingent or a combination of contingent and non-contingent reinforcement from adults for cooperative play. Subjects who received only contingent reinforcement exhibited cooperative play behaviors when any adult entered the room with a reinforcement cup. Subjects in the mixed condition exhibited cooperative play only when an adult who dispensed contingent reinforcement entered. The response did not generalize to novel adults. Contingent adults did not control behavior when they entered the room without a reinforcement cup.

Whitman, T.L., Mercurio, J.R. & Caponigri, V. Development of social responses in two severely retarded children. Journal of Applied Behavior Analysis, 1970, 3, 133-138

Two severely retarded children were reinforced for mutual participation in a ball rolling and block passing task. A fixed ratio of reinforcement was employed and the number of responses required for a reinforcement increased over the course of training. A progressive increase in these social responses was noted. Some generalizations to interaction with other children were reported.

Williams, L., Martin, G.L., McDonald, S., Hardy, L. & Lambert, L. Effects of a backscratch contingency of reinforcement for table serving on social interaction with severely retarded girls. Behavior Therapy, 1975, 6, 220-229

A "backscratch" reinforcement contingency was established in order to develop social interaction behaviors in severely retarded girls. The

contingency consists of rewarding subject A for subject B's appropriate responses. This technique resulted in increases in such behaviors as eye contact, verbalization, pointing and touching between pairs of subjects compared with baseline and individual reinforcement conditions.

Wright, E.C., Abbas, K.A. & Meredith, C. A study of the interactions between nursing staff and profoundly mentally retarded children. British Journal of Mental Subnormality, 1974, 20, 14 - 17.

Interactions between nursing staff and sixteen profoundly retarded patients were recorded. An average of six percent of each staff member's time was spent interacting with patients. The results of a qualitative assessment of these interactions indicated that interactions which promote independent behavior occurred with a lower frequency than either neutral or dependency promoting interactions. It was also noted that patient initiated interactions occurred less frequently than staff initiated interactions.

Wright, J., Clayton, J. & Edgar, C.L. Behavior modification with low level mental retardates. Psychological Record, 1970, 20, 465 - 471.

Fifteen low functioning children received social reinforcement contingent upon appropriate relations with toys and peers. Inappropriate behaviors resulted in time out from reinforcement. Results indicated that statistically significant changes occurred both in an increase in appropriate behaviors and a decrease in inappropriate behaviors, but wide individual differences were noted.

SUMMARY

In general, research on the social development of severely and profoundly retarded individuals points to a variety of deficits, two major ones being little spontaneous imitation and initiated social interaction. Results of descriptive research of subjects' responses to experimenter-initiated interaction seems to indicate that although one can expect a range of individual differences in social responses between members of the population, a high degree of intra-subject consistency across situations can be expected. (Altman, et al, 1970; Cleland, et al, 1971).

Currently, little is known about the specific causes of these social deficits, particularly, the relative roles played by the intellectual deficits of the individuals and by the effects of being reared in an institutional environment where social interaction between caretaker and resident has been found to be minimal (Wright, et al, 1974).

Intervention and training studies have concentrated on teaching imitation skills and increasing social interaction. Imitation research indicates that severely and profoundly retarded individuals do not spontaneously imitate the behavior of others, so efforts have focused on applying operant procedures to train imitation. Although there are several demonstrations which indicate that low functioning retardates can be trained to imitate specific motor behaviors (Altman, et al, 1972; Bry & Nawas, 1972; Bucher & Bowman, 1974; Garcia, et al,

1971; Martin, 1972) by the employment of reinforcement, prompting and fading procedures, there has been little evidence of the development of a generalized imitative 'set' in which the individual will learn to spontaneously imitate any behavior. It seems that the best way to effect transfer from imitation of previously reinforced behaviors to new nonreinforced behaviors is to use new behaviors which are similar enough to the reinforced behaviors, so that the learner has difficulty discriminating between them (Bandura & Barab, 1974; Bucher & Bowman, 1974).

Research on increasing social interaction has also relied on operant techniques to increase interactions between institutionalized retardates. Although there is evidence that reinforcement which is consistently contingent on social interaction results in increased interaction between residents, there is little indication that these results generalize to other situations, or are maintained in the absence of reinforcement.

One approach that looks promising is the 'backscratch' reinforcement contigency in which one resident receives reinforcement contingent upon the behavior of another resident (Williams, et al,1975) Rather than receiving reinforcement for specific types of social behaviors this procedure concentrates on merely making low functioning retardates more aware of other individuals. This usually results in a spontaneous increase in whatever specific behaviors exist in the subject's repertoire.

In sum, the use of operant procedures has yielded some success in

training severely and profoundly retarded children to imitate the motor behaviors of others and initiate social interaction. A problem with this research is that social behavior does not seem to acquire any intrinsic reinforcement value in itself, therefore, it does not generalize to new situations or occur in the absence of contingent edible reinforcement. However, it has been demonstrated that this population does possess a repertoire of primitive social behaviors which its members will produce when they are motivated to become aware of their social environment. A variety of small group experiences in which the behavior of others has a marked consequence on these individuals' own need gratifications might be a necessary first step to training social responsiveness. This approach would initially focus on giving severely and profoundly retarded children repeated opportunities to utilize their existing repertoire of social behaviors, before teaching new social behaviors. Whether or not generalization of learned social responses could be achieved by first raising the general level of social awareness of these individuals is an empirical question which can only be answered by further research.

COMMUNICATION SKILLS

COMMUNICATION - COMPREHENSION

Berry, P.B. Comprehension of possessive and present continuous sentences by nonretarded, mildly retarded and severely retarded children. American Journal of Mental Deficiency, 1972, 76, 540 - 544.

Severe retardates, mild retardates, and normals all matched on MA, were presented with four types of sentences and asked to point to the drawing which represented each sentence. The types of sentences were: (a) singular possessive; (b) plural possessive; (c) singular present continuous; and (d) plural present continuous. All children found possessive sentences more difficult to comprehend than present continuous senterces. No other significant differences were found.

Bricker, W.A. & Bricker, D.D. Development of receptive vocabulary in severely retarded children. American Journal of Mental Deficiency, 1970, 74, 599 - 607.

Subjects were pretested then trained to discriminate between pairs of objects on the basis of a verbal label given by the experimenter. Two training procedures were employed: (a) a random sequence in which the named item never appeared in two consecutive trials, and (b) a structured sequence in which the named object was presented as one of the objects in the pair until criterion was reached. Results indicated that subjects who showed progress during the pretest benefited more from the structured sequence that the random sequence.

Neither procedure was effective in training subjects who showed no learning during the pretesting phase.

Kazdin, A.E. & Erickson, L.E. Developing responsiveness to instructions in severely and profoundly retarded residents. Journal of Behavior Therapy & Experimental Psychiatry, 1975, 6, 17 - 21.

Severely and profoundly retarded females were taught to respond to three verbal commands with the appropriate motor behaviors. Reinforcement, and prompting with fading procedures were used. Gradually the subjects were required to perform the entire sequence of commands before receiving reinforcement. Dramatic improvement was noted.

Striefel, S., Bryan, K.S. & Aikins, D.A. Transfer of stimulus control from motor to verbal stimuli. Journal of Applied Behavior Analysis, 1974, 7, 123 - 135.

Three profoundly retarded subjects who had been previously taught to imitate motor behaviors were taught to follow verbal instructions. A transfer of stimulus control procedure was employed. After a subject's successful imitation of a motor behavior, a verbal instruction was presented just prior to the model's behavior. Gradually the time between the instruction and the model's behavior was increased. The subjects learned to respond appropriately to the verbal instructions, but no generalization occurred.

Striefel, S. & Wetherby, B. Instruction-following behavior of a retarded child and its controlling stimuli. Journal of Applied Behavior Analysis, 1973, 6, 663 - 670.

A profoundly retarded boy was taught appropriate responses to a series of verbal instructions. Reinforcement and prompting with fading procedures were employed. Although improvement was noted in the subject's responses to instructions which were taught, the procedures did not develop generative instruction-following capability.

Talkington, L.W., Hall, S.M. & Altman, R. Use of a peer modeling procedure with severely retarded subjects on a basic communication response skill. Training School Bulletin, 1973, 69, 145 - 149.

Severely retarded children were divided into three treatment groups: (a) subjects observed peers model appropriate responses to verbal commands and received social reinforcement for appropriate responses to the commands; (b) subjects received social reinforcement for appropriate responses to verbal commands but no models were used; (c) control subjects received equal activity time but no training. Pre- and posttest scores on the Verbal Language Development Scale indicated that the modeling group achieved significantly greater changes than the praise group, which in turn achieved significantly greater changes than the control group.

Whitman, T.L., Zakaras, M.& Chardos, S. Effects of reinforcement and guidance procedures on instruction-following behavior of severely retarded children. Journal of Applied Behavior Analysis, 1971, 4, 283 - 290.

Two severely retarded children with limited language development were taught to respond appropriately to eleven verbal instructions. Edible reinforcements, and prompting with fading procedures were used. Training resulted in an increase in appropriate responses to the verbal instructions, and generalized to other verbal instructions, as well.

Baer, D.M. & Guess, D. Teaching productive noun suffixes to severely retarded children. American Journal of Mental Deficiency, 1973, 77, 498 - 505.

Four severely retarded children with modest vocabularies were taught to produce noun suffixes when labeling stimuli which exemplified the verb form of an action or activity. Differential reinforcement and imitation procedures were employed. Once criterion was reached the subjects produced the noun plus 'er' ending on the first presentation of each depiction of a new verb.

Barton, E.S. Inappropriate speech in a severely retarded child: a case study in language conditioning and generalization. Journal of Applied Behavior Analysis, 1970, 3, 299 - 307.

Operant techniques were used to modify the inappropriate speech of a severely retarded child. The child was presented with pictures and was reinforced for appropriate verbal responses. Inappropriate responses were negatively reinforced by a time out period. A marked increase in appropriate speech was reported, but the increase did not generalize to conditions in which no reinforcement was dispensed. A reversal of contingency resulted in a decrease in appropriate utterances.

Barton, E.S. Operant conditioning of social speech in the severely subnormal and the use of different reinforcers. British Journal of Social and Clinical Psychology, 1972, 11, 387 - 396.

The social speech of four severely retarded women was operantly conditioned using a variety of reinforcements alone and in combination. Both tokens and edible reinforcements were effective in increasing social speech. Tokens yielded greater increases than edibles. A cue light did not acquire secondary reinforcement value.

Barton, E.S. Operant conditioning of appropriate and inappropriate social speech in the profoundly retarded. Journal of Mental Deficiency Research, 1973, 17, 183 - 191.

Three profoundly retarded women received token reinforcement for any verbalization, inappropriate speech and appropriate speech in a reversal design. In each phase the type of verbaliztion which resulted in reinforcement increased but there was little generalization to other situations. During the extinction phase verbalization decreased, indicating that it, in itself, did not acquire reinforcement characteristics.

Bricker, W.A. & Bricker, D.D. Assessment and modification of verbal imitation with low-functioning retarded children. Journal of Speech and Hearing Research, 1972, 15, 690 - 698.

Thirty severely retarded children were tested for the ability to imitate consonant-vowel combination sounds. Results indicated that although retarded children made more errors than normal children, the patterns of errors for both types of children were similar. Ten of these children were selected for one of two types of training: (a) speech-sound imitation training; or (b) component imitation training which taught imitation of the consonant and vowel components of the speech sounds. Results indicated that learners in the speech-sound group made fewer errors than learners in the component group. This supports the notion of using a molar rather than a molecular strategy in teaching the imitation of sounds.

Butz, R.A. & Hasazi, J.E. Developing verbal imitative behavior in a profoundly retarded girl. Journal of Behavior Therapy and Experimental Psychiatry, 1973, 4, 389 - 393.

A profoundly retarded mute received edible reinforcements for imitating five sounds. Initially four phases of alternating non-contingent and contingent reinforcements for any vocalization were used to bring vocalization under the control of the experimenter. Then reinforcement was dispensed contingent upon specific sounds. Some generalization was reported.

Kircher, A.S., Pear, J. & Martin, G.L. Shock as punishment in a picture-naming task with retarded children. Journal of Applied Behavior Analysis, 1971, 4, 227 - 233.

Two experiments which employed electric shock as punishment during labeling training were reported. In the first study, two severely retarded children were presented with pictures of simple objects. The children were required to imitate the label and then spontaneously produce it. Correct responses were reinforced, while incorrect responses resulted in either a mild shock or simply the word 'no'. Inattention resulted either in a mild shock or was ignored. The main effect of the shock was in the reduction of inattentive behaviors, but it also produced a decrease in incorrect responses. While shock produced no undesirable side effects, the increase in performance was not dramatic enough to warrant its use in this setting. In the second study several fixed punishment ratios were employed. Results indicated that as the ratio between errors and shocks increases, the difference in effectiveness between shock and no-shock procedures diminishes.

Phillips, S., Liebert, R. & Poulos, R. Employing paraprofessional teachers in a group language training program for severely and profoundly retarded children. Perceptual & Motor Skills, 1973, 36, 607 - 616.

Severely and profoundly retarded children were pretested for their ability to label common objects, and divided into four ability groups. Each group received daily training for two months. Training consisted of imitating teachers and advanced pupils, and labeling and discrimination games. Social and edible reinforcements were used. Results

indicated significant improvement in labeling both actual objects and representations compared with control groups.

Twardosz, S. & Baer, D.M. Training two severely retarded adolescents to ask questions. Journal of Applied Behavior Analysis, 1973, 6, 655 - 661.

Two severely retarded boys were taught to name some letters, colors and numbers, through reinforcement and imitation procedures. Modeling was not an effective means of teaching the subjects to ask questions. Procedures were instigated to prompt and reward questions. The subjects learned to discriminate between items they knew how to label from items they did not know, by naming the familiar items and asking a question about the unfamiliar items.

Wheeler, A.J. Using attendants to build a verbal repertoire in a profoundly retarded adolescent. Training School Bulletin. 1973, 70, 140 - 144.

A sixteen year old profoundly retarded girl with a minimal verbal repertoire received edible reinforcements for imitating sounds and words. During the course of training reinforcement was shifted to praise and tokens, and the model was shifted from an experimenter to an attendant. Gradually forty-two functional words were brought under imitative control.

Bricker, D.D. Imitative sign training as a facilitator of word-object association with low-functioning children. American Journal of Mental Deficiency, 1972, 76, 509 - 516.

This study reports the results of a procedure designed to facilitate word-object association. A group of severely retarded children were trained to: (1) imitate nonverbal gestures; (2) produce those gestures in response to verbal signals (labels); (3) produce those gestures in response to both verbal signals and objects. Pre- and posttests consisted of a word-object association test. Comparisons with a no-training control group indicated significant gains on the word-object association test. The author speculates that gesture learning facilitated word-object association by increasing the discriminability between the various objects and words.

Carrier, Jr., J.K. Nonspeech noun usage training with severely and profoundly retarded children. Journal of Speech and Hearing Research, 1974, 17, 510 - 517.

A large group of severely and profoundly retarded children were taught to differentiate pictures of objects and represent those pictures with nonverbal symbols (differentially shaped chips). The children were taught to place the appropriate chip in a tray when they were presented with a picture of an object. Posttesting indicated that the responses generalized to different pictorial representations of the objects. This led to the interpretation that the chips were being

used as symbols to represent classes of events.

Guess, D., Rutherford, G., Smith, J.O. & Ensminger, E. Utilization of sub-professional personnel in teaching language skills to mentally retarded children: an interim report. Mental Retardation, 1970, 8, 17 - 23.

Two attendants were trained to teach communication skills to small groups of severely retarded children. Higher level children received level #1 of the Peabody Language Development Kit. For the lower level children the emphasis was on encouraging speech production, increasing response length and developing greater auditory discrimination. A token economy was established for each group. Four experimental and control groups were compared: (1) language training and special education; (2) language training only; (3) special education only; (4) neither special education nor language training. On both IQ and language development measures group (1) showed significant gains compared with group (4). There was a trend indicating that subjects who received language training (groups (1) and (2)) made greater gains on both measures than subjects who did not receive language training (groups (3) and (4)).

Hagen, C., Porter, W. & Brink, J. Nonverbal communication: an alternate mode of communication for the child with severe cerebral palsy. Journal of Speech and Hearing Disorders, 1973, 38, 448 - 455.

Four severely retarded nonverbal children were taught to use a communication device to signal distress and communicate basic needs. Operant conditioning procedures were used to shape the children's responses. Three out of the four children learned to use the device to call for help, answer yes/no questions, and to communicate a few basic needs. One of these children began generating his own signals in order to expand his repertoire. One child did not progress beyond using the device as a call for help.

Hallet, P., Sype, M.S. & Gates, J.K. A language-based curriculum for the mentally retarded. Mental Retardation, 1971, 9, 9 - 12.

This article presents the design of a new program developed to teach functional language to the severely and profoundly retarded. The program was designed to follow the normal sequence of language development: first reception, then comprehension, then production. Methods include: simplifying verbal instructions, active involvement of the learner, repetition and reinforcement. Individualization of training is stressed.

Kahn, J.V. Relationship of Piaget's sensorimotor period to language acquisition of profoundly retarded children. American Journal of Mental Deficiency, 1975, 79, 640 - 643.

This study investigated the Piagetian hypothesis that the concept of object permanence is a necessary pre-requisite for the development of language. Sixteen profoundly retarded children received tests on object permanence. Half of the subjects had demonstrated some degree of language development, the other half had no language. All of the subjects with some language functioned at stage six in some area of Piaget's sensorimotor period. These results imply that there may be certain cognitive prerequisites for language development which may be required before beginning language training.

Shiach, G., McG. The effectiveness of a Peabody Language Development Kit with severely subnormal children. British Journal of Educational Psychology, 1973, 43, 294 - 297.

A group of eleven severely retarded children received daily instruction with level P of the Peabody Language Development Kit for ten months. Pre- and posttests scores on several subtests of the Illinois Test of Psycholinguistic Abilities indicated that the group showed significant gains compared to a matched control on several of the subtests.

Stremel, K. Language training: a program for retarded children. Mental Retardation, 1972, 10, 47 - 49.

The language training program reported in this study was designed to teach production of the basic grammatical relations (subject-verb-

object). Behavior modification procedures were used to train production of ten action verbs. First the children learned to pair each verb with a gesture, then with a pictorial representation. Vocal imitation and production were added along with subject-verb, verb-object and subject-verb-object combinations. Training generalized to new constructions and if the subjects did not have the appropriate word, they would substitute a gesture, or 'uh' in its place.

Topper, S.T. Gesture language for a non-verbal severely retarded male. Mental Retardation, 1975, 13, 30 - 31.

This study reports an attempt to teach a gesture language to a twenty-eight year old profoundly retarded male. Thirteen symbols were devised which represented self-help skill activities. The gestures required gross rather than fine motor coordination. A picture of each activity was presented and labelled. Then the gesture was provided. The training consisted of shaping, imitation, then spontaneous production. After two months the subject learned all thirteen symbols.

Rydberg, S. Beginning reading discrimination taught at IQ 35 by conditioning. Perceptual and Motor Skills, 1971, 32, 163 - 166.

Six severely retarded children were presented with two learning tasks: (1) A series of cards containing a printed word on one side and a picture of the corresponding object on the other side were presented. The subjects read the word and when errors were made the subject was shown the picture on the reverse side. (2) Several cards were presented and the subjects were required to pick out the card containing the correct printed word. Subjects with higher MAs learned 9 of the 10 words, while the lower MA subjects learned 1 to 4 of the words. A delayed posttest indicated that the learning was maintained after 48 days.

Sidman, M. Reading and auditory-visual equivalences. Journal of Speech and Hearing Research. 1971, 14, 5 - 13.

A seventeen year old severely retarded boy was taught to read words orally and with comprehension. The subject was capable of matching spoken words to pictures and naming pictures. Teaching focused on matching spoken words to printed words. Having learned to match spoken word samples to printed word choices, the subject was then able, without additional teaching, (1) to match picture samples to printed

word choices; (2) to match printed words samples to picture choices; and (3) to name printed words.

Sidman, M. & Cresson, Jr., O. Reading and crossmodal transfer of stimulus equivalences in severe retardation. American Journal of Mental Deficiency, 1973, 77, 515 - 523.

Two severely retarded boys were taught to read words orally with comprehension. The learning sequence involved (1) visual discrimination-matching printed words to each other; (2) auditory comprehension-matching dictated words to pictures; and (3) matching dictated words to printed words. Once the subjects learned the equivalences of dictated words to both pictures and printed words, the learning transferred to the equivalence of printed words to pictures.

SUMMARY

Two of the primary emphases in the literature on communication skills have been the application of operant procedures to shape appropriate motor responses to verbal instructions and imitation of words, sounds and phrases. The ability to train severely and profoundly retarded individuals to follow simple instructions has important implications in terms of facilitating behavior management, especially in crowded institututional environments. Two approaches are used to teach discriminated responses to verbal commands. Prompting and fading procedures which consist of manually guiding the learner through the desired response, then gradually omitting the guidance are one method used in conjunction with reinforcement (Kazdin & Erickson, 1975; Striefel & Whetherby, 1973; Whitman, Zakaras, and Chardos, 1971) Another approach is to first reinforce motor imitation of a model then bring the response under the control of verbal cues (Striefel, Bryan & Aikins, 1974, Talkington, Hall, & Altman, 1973).

Operant conditioning of speech production has focused on the imitation of words, sounds and phrases. Generally, subjects are used who have previously demonstrated some vocalization, and the subjects' utterances are gradually shaped until they approximate those of the model. This procedure has resulted in successful imitation of sounds (Bricker & Bricker, 1972; Butz and Hasazi, 1973, Wheeler, 1973) words

(Kircher, Pear & Martin, 1971; and Wheeler, 1973) and grammatical constructions such as the addition of noun suffixes (Baer & Guess, 1973) and question formulation (Twardosz & Baer, 1973).

A problem with these studies of operant approaches to communication skills is that few of the studies have attempted to examine whether the skills transfer to other situations or result in generative language skills. Several studies (Striefel & Whetherby, 1973; Striefel, et al, 1974) reported that these procedures did not result in generative instruction-following capability. In general, when generative skills were reported the subjects selected evidenced some comprehension and production before training began (Baer & Guess, 1973; Twardosz & Baer, 1973; Whitman, et al, 1971).

Operant procedures have also been used to shape appropriate social speech (Barton, 1970, 1972, 1973). Again the results failed to generalize to new situations and the learned behavior decreased in the absence of positive reinforcement, indicating that the verbalization itself did not acquire secondary reinforcement characteristics.

As an alternative to the types of training cited above, some investigators have attempted to teach forms of nonverbal communication to low-functioning retardates. Some success has been reported in teaching retardates to use gestures, either as a language in itself (Topper, 1975) or to facilitate word-object association

(Bricker & Bricker, 1972). Hagen, Porter and Brink (1973) reported success in teaching severely retarded nonverbal children to use an electronic signalling device to communicate basic needs.

Two other alternative approaches to language attempt to simulate the natural course of language development. One program developed to teach functional language (Hallet, Sype & Gates, 1971) stresses the active involvement of the learner and following the normal sequence of language acquisition begins first with reception training, then employs comprehension training and finally production training. Stremel (1972) reported the preliminary results of a program which is attempting to train generative language by teaching the construction and production of the basic grammatical relations: subject-verb-object.

Finally, some training studies in beginning reading have been reported which employ higher functioning severely retarded individuals. These studies teach reading as a complex discrimination problem (Rydberg, 1971; Sidman, 1971; Sidman & Cresson, 1973). Although the results of these studies indicate that the learning does not generalize to new words unless they are specifically trained, the ability to read and comprehend a few simple labels may have some practical applications in the institutional setting, particularly in sheltered workshops.

Although all of the studies cited above have reported some success in the area of communication training, several investigators

(Bricker & Bricker, 1970, 1972; Hagen et al, 1973) have noted wide individual differences in terms of the degree to which subjects benefited from communication training. Kahn (1975) examined the possibility that the notion of readiness may play a role in the onset of natural language acquisition with severely and profoundly retarded individuals. He reported that retardates who evidenced some degree of natural language development also were functioning at stage six on tests of Piagetian sensorimotor intelligence . Whether or not this level of sensorimotor functioning is a necessary prerequisite for success in language training is a question open for future research.

In sum, the problem of training communication skills with the severely and profoundly retarded population has been approached in a variety of ways. On the whole investigators have had more success in training specific language skills than in developing generative language capabilities. However, some specific skills such as simple instruction-following behavior would be useful in facilitating behavior management, and could be taught as goals of instruction in themselves, without the expectation that a generative linguistic capabilities will develop.

DISCRIMINATION LEARNING

80

Glenn, S.M. & Pickersgill, M.J. Capacity of severely subnormal children with relation to the non-additivity of cues effect and to discrimination difficulty. Quarterly Journal of Experimental Psychology, 1970, 22, 305 - 317.

In the first of two experiments presented, severely retarded children were trained to discriminate between stimuli differing on two dimensions. Both dimensions were relevant to the discrimination. When the subjects reached a criterion performance, they were tested on transfer tasks in order to determine to which dimension(s) the subjects were responding. Results indicated that slow learners tended to learn the discrimination in terms of only one of the two relevant dimensions, while fast learners tended to learn both dimensions. Results of a second study indicated that the more difficult the discrimination, the greater the likelihood that subjects would learn it in terms of only one of the two possible relevant dimensions.

Hogg, J. & Evans, P.L.C. Stimulus generalization following extra-dimensional training in educationally subnormal (severely) children. British Journal of Psychology, 1975, 66, 201 - 224.

In this study a group of severely retarded children learned to differentially respond to two stimuli which differed in orientation. Two control groups were employed, one receiving equal exposure but no

differential training on the orientation dimension; the other receiving no exposure to the orientation dimension. The transfer test examined generalization to a new dimension (hue). Only members of the experimental group demonstrated clear indications of transfer to the new dimension. Two theoretical explanations can account for the transfer: (1) the Ss learned that stimulus differences function as the controlling stimuli, or (2) the subjects learned to attend to the relevant aspects of the display and ignore irrelevant aspects.

Jacobson, L.I., Bernal, G. & Lopez, G.N. Effects of behavioral training on the functioning of a profoundly retarded microcephalic teenager with cerebal palsy and without language or verbal comprehension. Behavior Research and Therapy, 1973, 11, 143 - 145.

A profoundly retarded male participated in a variant of the Conceptual Development program which consisted of a series of discrimination problems with a gradual increase in the number relevant dimensions which must be considered. Modeling and reinforcement procedures were used. Results indicated that as a learning set developed and as training progressed the subject required fewer trials per problem to reach criterion performance.

Mackay, C.K. The transfer of specific and non-specific learning by severely subnormal adults. British Journal of Psychology, 1973, 64, 405 - 412.

Severely retarded adults were trained on a discrimination task and then tested on three types of transfer - positive (specific), negative (specific) and nonspecific. Results indicated transfer on all three tasks. The greatest amount of transfer was found on the positive specific transfer task, and the least was found on the nonspecific transfer task.

Mackay, C.K. & Brown, J. A learning strategy in normal children and severely subnormal adults. Psychonomic Science, 1971, 23, 391 - 392.

Normal children and severely retarded adults matched for MA learned a simple color sort discrimination. During training, placement of only one of the two colors was specifically instructed, but correct placement of either color resulted in reinforcement. Results of transfer tasks indicated that both groups had learned to respond appropriately to each of the original colors, and failed to support the hypothesis that normals and severe retardates would employ different strategies in this discrimination learning problem.

Touchette, P.E. Transfer of stimulus control: measuring the moment of transfer. Journal of the Experimental Analysis of Behavior, 1971, 15, 347 - 354.

Three severely retarded boys were taught a simple two choice discrimination problem which consisted of pressing a red key which was presented simultaneously with a white one. Transfer to form dis-

crimination was effected by superimposing black figures on the keys. With each correct response, the appearance of the color cues was delayed for an additional 0.5 seconds. A correct response to the form discrimination before the onset of the color cues served to indicate the transfer of stimulus control from the color cues to the differences in form. Results indicated that the point of transfer can vary greatly, since both inter and intra-subject differences were observed in the point at which the subjects began responding to the forms alone. However, the number of trials to transfer deceased systematically with successive reversals in every case.

Van Dudenhaven, N.J. & Van Der Aart, W.J. Auditory discrimination learning and transfer in imbeciles. Journal of Mental Subnormality, 1968, 14, 98 - 100.

A group of severely retarded adolescents were taught to discriminate musical sounds and point to a picture of the appropriate instrument. A pre- and posttest consisted of the same task with different sounds and instruments. Comparisons with a no-treatment control indicated significant improvement for the experimental group, and considerable transfer from the treatment task to the posttest task was evidenced.

Das, J.P. Vigilance and verbal conditioning in the mildly and severely retarded. American Journal of Mental Deficiency, 1970, 75, 253 - 259.

Mildly and severely retarded individuals were presented with conditioning and vigilance tasks. Performance scores indicated that severely retarded individuals were slower on latency and acquisition to criterion measures in all phases of conditioning, when compared with mildly retarded individuals. Severely retarded individuals also demonstrated inferior performance on a complex vigilance task.

Dickerson, D.J. & Girardeau, F.L. Oddity preference by mental retardates. Journal of Experimental Child Psychology, 1970, 10, 28 - 32.

Severely and mildly retarded individuals were presented with a series of ten-trial oddity problems containing one odd stimulus and two, three or four identical stimuli, under non-reward conditions. Mildly retarded subjects responded to the odd object significantly above chance expectancy on all three types of problems. Severely retarded subjects responded to the odd object significantly above chance expectancy on the three and four identical stimuli problems. The results indicate: (1) both levels of retardates respond to oddity as a stimulus characteristic, independent of its concurrent association

with reward;(2) the oddity preference was greater for the mildly retarded group than for the severely retarded group.

Lowry, P.W. & Ross, L.E. Severely retarded children as impulsive responders: improved performance with response delay. American Journal of Mental Deficiency, 1975, 80, 133 - 138.

Four severely retarded individuals were classified as impulsive responders according to their scores on a revised version of the Matching Familiar Figures test. They were presented with a series of two choice discrimination problems under two conditions: (1) the stimuli were accessible immediately, (2) the stimuli were visible but out of reach for five seconds. Results indicated that while the subjects performed at chance level during the no delay condition, performance rose steadily under the delay condition. The investigators concluded that impulsivity may be a factor which accounts for poor discrimination performance.

Mackay, C.K. Ikonic imagery in the severely subnormal. British Journal of Psychology, 1972, 63, 597 - 603.

Twenty-three severely retarded subjects received IQ tests and matrix problems involving replacement, reproduction and transposition. Performance on the matrix problems was related to MA. Retardates' abilities to reproduce and transpose matrices emerge at the same time, contrary to normal children's development where reproduction based on ikonic imagery emerges before transposition. These findings imply

that:(1) there may be differences between cognitive development patterns of normal and retarded children; and (2) teaching procedures for retardates should rely heavily on visual aids.

Sinson, J. & Wethernick, N.E. Short-term retention of color and shape information in mongoloid and other severely subnormal children. Journal of Mental Deficiency Research, 1973, 17, 177 - 182.

Severely retarded Down's and non-Down's Syndrome children received several color and shape discrimination tasks. The tasks consisted of successive matching, simultaneous matching and pointing in response to a verbal color or shape label. Down's Syndrome children made many errors on the successive color matching and pointing to named color tasks. They experienced little difficulty on simultaneous color matching and the three shape tasks. Non-Down's children had little difficulty on any of the tasks. Results point to a possible color retention deficit in Down's Syndrome children.

Beasley, N. & Hegarty, J. The use of touch-tutor with severely subnormal children. Journal of Mental Subnormality, 1970, 16 113-118.

A teaching machine was used to teach a matching-to-sample task to severely retarded children. Two factors which might influence learning were systematically varied: (1) progressive build up of problem difficulty versus a random order in which easy and hard problems were interspersed; (2) no sound versus sound in which the machine named the object after a subject made a correct matching response. Results indicated little effect of either factor on learning. Subjects who learned the task during pre-training sessions performed well under all conditions while subjects who had difficulty at the beginning of the sessions showed little improvement under any condition.

Harvey, E. & Hornstein, R. The effects of visual cue fading and task complexity on auditory discrimination in severely retarded children. Psychological Record, 1974, 24, 109-117.

This study investigated the effects of visual cue fading and task complexity on auditory discrimination learning. Twenty severely retarded children were assigned to one of four treatment groups: (1) simple task, visual cue fading; (2) complex task, visual cue fading; (3) simple task, no visual cue; (4) complex task, no visual cue. Results indicated that the presence of the additional cue facilitated

discrimination learning on the simple task, while the presence of the additional cue did not facilitate learning on the complex discrimination which all subjects found very difficult.

Herriot, P. The effect of order of labeling on the subjective organization and clustering of severely retarded adults. American Journal of Mental Deficiency, 1972, 76, 632-638.

Two experiments are presented which examine the effects of two labeling procedures on the organization and memory of a series of pictures. Labeling was forced either: (1) in the order of the previous recall of the stimuli, or (2) in a random order. Results indicated that forced labeling in the order of previous recall led to greater subjective organization of the stimuli. The second study investigated the effects of these labeling procedures on clustering related items. It was predicted that random order presentation would lead to more clustering than ordering according to previous recall. Results indicated some evidence to support the prediction, but a significant triple interaction indicated that the predicted effect was obtained for Down's syndrome subjects only on the second day of testing, and for the non-Down's syndrome subjects only on the first day of testing.

Redd, W.H. Attention span and generalization of task-related stimulus control: effects of reinforcement contingencies. Journal of Experimental Child Psychology, 1972, 13, 527-539.

Two severely retarded children were individually brought into a play

room and their play behavior was recorded through a one-way mirror. An experimenter presented the children with three tasks which required dropping small objects through holes in a cannister. The objects and each of the tasks were associated with a different training regime: extinction (no reinforcement), contingent, or non-contingent reinforcement. The task which was associated with contingent reinforcement functioned as a discriminative stimulus and evoked previously reinforced behavior. This stimulus control was maintained in new settings with other adult agents of reinforcement.

SUMMARY

The discrimination learning paradigm consists of teaching individuals to make different responses to different stimuli. An example of the simplest discrimination learning situation would be to reinforce a learner for pressing a lever when a white light is illuminated. When the learner presses the lever when a red light is illuminated his response is either ignored or punished. Thus, over trials, the learner eventually will press the lever only when he has seen the white light.

The results of a variety of discrimination learning studies which employ low functioning retardates as learners have implications for training retardates in natural learning situations. Often the tasks are considerably more complex than the example given above. Implicit in many of these studies is the importance of obtaining a "match" between the child's entering level of cognitive functioning and the learning task. Several studies report that when the tasks are too difficult, little learning takes place, regardless of attempts to manipulate the learning conditions (Beasley & Hegarty, 1970; Harvey & Bornstein, 1974). However, some studies do indicate that some individuals can learn complex multi-dimensional discriminations if training is structured so that there is a gradual increase in the number of dimensions to which the learner must attend in order to correctly solve the problem (Jacobson, Bernal, & Lopez, 1973). For higher functioning severely retarded individuals engaged in sheltered workshop programs, discrimination of parts to be assembled is often a first step in

successful learning of the task. Often the required discriminations can be simplified by color-coding or other extra cues (see section of Pre-Vocational Skills).

Research indicates that certain characteristics of severely and profoundly retarded learners can interfere with training. For example, MacKay (1972) points out that members of this population may be deficient in ikonic imagery (the ability to maintain a mental picture of a stimulus display, once the display has been removed). Therefore, teaching procedures should incorporate the use of visual aids in order to enable the learners to remember what was previously presented. There is also some evidence that children with Down's syndrome have difficulty retaining information about the color of objects (Sinson & Wethernick, 1973) so other cues would be more effective as aids to increasing the discriminability of objects. Another factor which may influence performance is impulsive responding. This consists of making a response immediately after being presented with a choice, rather than "thinking" through the problem. Some research indicates that if the choices are presented visually to the learner but are not immediately accessible for his response, performance improves (Lowry & Ross, 1975).

A final focus of discrimination learning research with this population has been the problem of transfer of learning from one situation to another. Essentially there are two types on transfer: (1) specific transfer consists of applying what has been specifically taught to a new problem. For example, if a child is taught that blue is correct

and red is wrong when presented with blue and yellow the child will continue to chose blue. (2) Non-specific transfer consists of "learning how to learn". For example if the child is taught blue is correct and red is wrong, then yellow is correct and green is wrong it will take fewer trials to teach the second problem once the learner already knows the first one.

Although the difficulty of the discrimination learned seems to effect the amount of specific transfer that will occur (Glenn & Pickersgill, 1970) there is considerable evidence that severely and profoundly retarded individuals are capable of both specific (Glenn & Pickersgill, 1970; MacKay, 1973; MacKay & Brown, 1971) and non-specific transfer (Hogg & Evans, 1975; Jacobson, et al, 1973; MacKay, 1973; Touchette, 1971; and Van Dudenhaven & Van Der Aart, 1968).

In summary, the discrimination learning research does have implications for training severely and profoundly retarded individuals. If an individual appears to be having difficulty with a particular discrimination problem which is relevant to the training task at hand, a useful approach might be to try to determine whether particular aspects of the problem are causing the difficulty. For example, if the task requires discrimination by color, one could test the individual to determine if he/she had difficulty with other simple discriminations, such as shape. If the particular dimension required is the source of difficulty the coding could be changed. If certain learner characteristics such as 'impulsivity' were determined as the source of dif-

ficulty procedures would have to be built in to eliminate the possibility of an immediate response. Finally if the discrimination appears to be too difficult training procedures might be built in which begin with simple discriminations between highly disparate objects and gradually changed so that the final problem consists of the original required discrimination.

REDUCTION OF NEGATIVE BEHAVIORS

Baumeister, A.A. & Forehand, R. Social facilitation of body rocking in severely retarded patients. Journal of Clinical Psychology, 1970, 26, 303-305.

Two studies are reported pertaining to social influences on body rocking. In the first study subjects were observed under two conditions: (1) alone in a room, and (2) in a group with three other body rockers. Results indicated that individual patients' rates of rocking were higher in the presence of other rockers than when they were alone in a room. The second study examined rocking rates of patients alone and in the presence of a group of non-rockers. Again rocking was higher in the group situation. Considered together these studies imply that the social facilitation of stereotypies does not appear to be imitative.

Baumeister, A.A. & Forehand, R. Effects of extinction of an instrumental response on stereotyped body rocking in severe retardates. Psychological Record, 1971, 21, 235-240.

Frequency of stereotyped rocking was recorded under three conditions: baseline, during reinforced lever-pressing, and during experimentally induced frustration. Results indicated that rocking decreased during lever-pressing and increased under the frustration condition. These findings offer some support for the hypothesis that rocking can at times be a response to frustration.

Flavell, J.E. Reduction of stereotypies by reinforcement of toy play. Mental Retardation, 1973, 11, 21-23.

This study attempted to reduce stereotypies by reinforcing incompatible behaviors. Results indicated that although stereotypies decreased in frequency when incompatible behaviors were reinforced, they returned when reinforcement for incompatible behaviors was no longer present.

Forehand, R. & Baumeister, A.A. The effect of auditory and visual stimulation on stereotyped rocking behavior and general activity of severe retardates. Journal of Clinical Psychology, 1970, 26, 426-429. (a)

Results of two studies are reported which investigate the effects of two types of stimulation on repetitive rocking behaviors. The presence of visual stimulation resulted in a decrease in rocking, while the presence of auditory stimulation resulted in an increase in rocking.

Forehand, R. & Baumeister, A.A. Effect of frustration on stereotyped body rocking: follow-up. Perceptual and Motor Skills, 1970, 31, 894. (b).

Eight severely retarded subjects were observed both prior to and immediately following experimentally induced frustration. Although rate of rocking increased immediately following frustration, it resumed its prefrustration level after approximately five minutes.

Forehand, R. & Baumeister, A.A. Body rocking and activity level as a function of prior movement restraint. American Journal of Mental Deficiency, 1970, 74, 608-610. (c)

Body rocking rates for six severely retarded males were recorded both prior to and immediately following 18 minutes of physical restraint. Rocking rates increased significantly following the restraint.

Forehand, R. & Baumeister, A.A. Effects of various auditory-visual stimulation on the activity level of severe mental retardates. American Journal of Mental Deficiency, 1970, 74, 470-474. (d)

Activity levels of 18 severe retardates were recorded under a variety of levels of environmental stimulation. Increased environmental stimulation (auditory, visual or a combination of the two) resulted in a decrease in activity level, while a decrease in environmental stimulation (darkening the room) resulted in an increase in activity level.

Higenbottam, J.A. & Chow, B. Sound-induced drive, prior motion restraint and reduced sensory stimulation effects on rocking behavior in retarded persons. American Journal of Mental Deficiency, 1975, 80, 231-233.

Results of a study of rocking behaviors of 16 retardates (ranging from mild to profound retardation) indicated: (1) prior restraint had no significant effect on increasing rate of rocking; (2) a combination of restraint and decrease in stimulation (darkness) had a significant

effect in increasing rate of rocking; and (3) auditory stimulation during the post treatment phase resulted in a significant increase in rate of rocking regardless of treatment condition.

Reardon, D.M. & Bell, G. Effects of sedative and stimulative music on activity levels of severely retarded boys. American Journal of Mental Deficiency, 1970, 75, 156-159.

Eleven severely retarded patients were exposed to several types of music and frequency of stereotyped behaviors was recorded. Results indicated that auditory stimulation reduced stereotyped behaviors and supported the theory that stereotyped behavior is a form of self-stimulation.

Smeets, P.M. The effects of various sounds and noise levels on stereotyped rocking of blind retardates. Training School Bulletin, 1972, 68, 221-226.

Three severely retarded patients were exposed to four types of auditory stimulation at three decibel levels. An increment from a low decibel level to a middle decibel level resulted in a decrease in rate of rocking while an increase from a middle to high decibel level resulted in an increase in rocking behavior. There was no significant type of auditory stimulation effect.

Stevens, E.A. Some effects of tempo changes on stereotyped rocking movements of low level mentally retarded subjects. American Journal of Mental Deficiency, 1971, 76, 76-81.

Effects of tempo changes in auditory stimulation on body rocking were examined for 12 low level retardates. Results indicated that tempo changes affected rocking if the tempo was compatible with the subjects' rocking rates. Fast rockers increased rocking when music tempo was increased, but decreased rocking during slow tempos. In contrast, slow rockers decreased rocking during fast tempos and increased rocking during slow tempos.

Warren, S.A. & Burns, N.R. Crib confinement as a factor in repetitive and stereotyped behavior in retardates. Mental Retardation, 1970, 8, 25-28.

Repetitive behaviors of fifty-five patients were recorded under two conditions, crib confinement and non-confinement. Results indicated that certain stereotypies (i.e., rocking) occurred more frequently during crib confinement, while other behaviors (i.e., headbanging) occurred more frequently under non-confinement conditions. The results were interpreted as indicating that different stereotypies may serve different functions. Rocking may be a form of self-stimulation while headbanging may be a form of eliciting attention.

SELF-INJURIOUS BEHAVIORS

Corte, H.E., Wolf, M.M. & Locke, B.J. A comparison of procedures for eliminating self-injurious behavior of retarded adolescents. Journal of Applied Behavior Analysis, 1971, 4, 204-213.

This study investigated the relative effectiveness of three methods of eliminating self-injurious behavior. Punishment (electric shock) was the most effective method; reinforcement of incompatible behaviors was the next most effective; while the elimination of social consequences (i.e., attention) was the least effective method. It was noted that the effects of punishment were situation-specific. For generalization to occur, shock probably needs to be applied in a variety of settings.

Hall, H., Thorne, E., Shinedling, M. & Sagers, P.S. Overcoming situation-specific problems associated with typical institutional attempts to suppress self-mutilative behavior. Training School Bulletin, 1973, 70, 111-114.

This study investigated the use of electric shock in order to eliminate the self-mutilative behavior of an 11 year old profoundly retarded male. A four phase procedure which involved shifting the agent of negative reinforcement from a psychologist to cottage attendants and observing the subject through a one-way mirror resulted in a significant decrease in self-mutilative behaviors and some generalization across all situations.

Marks, P. & Ball, T.S. Hazardous voluntary falling: a treatment approach. Mental Retardation, 1974, 12, 36-39.

The voluntary falling behavior of a severely retarded female was reduced by reinforcing an incompatible behavior (sitting). Generalization occurred by training the child to sit on a rug, which could then be placed on a chair or a bed. Gradually, falling behavior was eliminated even when the rug was no longer present.

Prochaska, J., Smith, N., Marzilli, R., Colby J. & Donovan, W. Remote-control aversive stimulation in the treatment of headbanging in a retarded child. Journal of Behavior Therapy and Experimental Psychiatry, 1974, 5, 285-289.

Time out, and reinforcement of incompatible behavior procedures were ineffective in eliminating headbanging in a profoundly retarded boy. Electric shock was effective in reducing the behavior but only when both the apparatus and the experimenter were present. The use of a remote-control device worn by the subject reduced headbanging to zero.

Weiher, R.G. & Harman, R.E. The use of omission training to reduce self-injurious behavior in a retarded child. Behavior Therapy, 1975, 6, 261-268.

A severely retarded boy received reinforcement (food) only following periods when no headbanging occurred. Gradually the length of the

intervals between reinforcements were increased. Headbanging was reduced to zero in the experimental situation and generalization to other situations occurred. New more appropriate social behaviors accompanied the elimination of the headbanging response.

Young, J.A. & Wincze, J.P. The effects of the reinforcement of compatible and incompatible alternative behaviors on the self-injurious and related behaviors of a profoundly retarded female adult. Behavior Therapy, 1974, 5, 614-623.

Several methods of reducing self-injurious behaviors were investigated using a multiple-baseline procedure. Reinforcement of a physically compatible behavior did not yield a decrease in self-injurious behavior. Reinforcement of a physically incompatible behavior reduced the frequency of one class of injurious behavior while another compatible class of injurious behavior increased. Response contingent shock was the most effective method for suppressing the class of injurious behavior. However, there was evidence of symptom substitution indicating that the learning did not generalize.

MISCELLANEOUS NEGATIVE BEHAVIORS

Barrett, B.H. Behavioral differences among an institution's back ward residents. Mental Retardation, 1971, 9, 4-9.

During training attempts with two wards of low functioning retardates, behavioral differences between wards were noticed. The ward with more instances of behavioral disturbances was found to have less crowding and a higher staff: patient ratio. It was hypothesized that residents of this ward received more positive reinforcement (attention) for negative behaviors. These findings imply that changes should focus on qualitative changes in environmental conditions.

Conway, J.B. & Bucher, B.B. "Soap in the mouth" as an aversive consequence. Behavior Therapy, 1974, 5, 154-156.

The frequency of tantrums of a profoundly retarded girl was reduced using negative reinforcement contingent upon the occurrence of the undesirable behavior. A squirt of shaving cream in the subject's mouth served as the negative reinforcement.

Husted, J.R., Hall, P. & Agin,B. The effectiveness of time out in maladaptive behavior in autistic and retarded children. Journal of Psychology, 1971, 79, 189-196.

Time out procedures were used to reduce aggressive behaviors in four profoundly retarded children. Although the procedures reduced

instances of aggression in the learning situation, there was little generalization to other situations.

Kreger, K.C. Compensatory environment programming for the severely retarded behaviorally disturbed. Mental Retardation, 19/1, 9, 29-32.

This article recommends instituting environmental changes which will reduce behavior disorders before attempting to train the severely retarded. Two suggested areas for change are: (1) reducing sensory deprivation by making the environment more stimulating; and (2) eliminating stresses which result from crowding by unconventional uses of institutional space.

Lutzker, J.R. Social reinforcement control of exhibitionism in a profoundly retarded adult. Mental Retardation, 1974, 12, 46-47.

The exhibitionism of a profoundly retarded male was eliminated by a differential social reinforcement procedure. The subject received social reinforcement at regular intervals for any behavior other than exhibitionism. Exhibitionism resulted in time out from social reinforcement.

Paluck, R.J. & Esser A.H. Controlled experimental modification of aggressive behavior in territories of severely retarded boys. American Journal of Mental Deficiency, 1971, 76, 23-29.

Territorial behaviors of twenty-one severely retarded boys were examined. Results indicated that all subjects had territories. Experimental attempts to punish territorial aggression were ineffective in reducing the behavior. These results imply that some forms of aggression may be innate responses which are not easily subject to modification.

Vukelich, R. & Hake, D.F. Reduction of dangerously aggressive behavior in a severely retarded resident through a combination of positive reinforcement procedures. Journal of Applied Behavior Analysis, 1971, 4, 215-225.

Time out procedures alone were ineffective in reducing the aggressive behaviors of a severely retarded girl. A combination of time out procedures and positive reinforcement in the form of food and extra attention for incompatible behaviors succeeded in eliminating the aggressive behaviors. Extra attention during post treatment phases was necessary in order to maintain the treatment effects.

Whitman, T.L. Caponigri, V. & Mercurio, J. Reducing hyperactive behavior in a severely retarded child. Mental Retardation, 1971, 9, 17-19.

Hyperactive behaviors of a severely retarded child were reduced by reinforcing an incompatible behavior - chair sitting. During training

food and praise were used as reinforcers. The reduction of hyperactive behavior was maintained during the post treatment phase by intermittent unsystematic praise for the incompatible behavior.

SUMMARY

Severely and profoundly retarded individuals often exhibit a variety of negative behaviors such as headbanging, body rocking and aggressive behaviors which are either dangerous to the residents themselves or impede any attempts to train basic life skills. There are two basic approaches to treatment. One approach speculates that these negative behaviors are the result of past reinforcement contingencies in the form of attention from the staff in response to these negative behaviors (Barrett, 1974). Treatment consists of changing the reinforcement contingency so that (1) these negative behaviors are either negatively reinforced with mild electric shocks (Corte, Wolf & Locke,1971; Hall,et al, 1973; Prochaska,et al,1974; Young & Wincze, 1974); or (2) the residents receive positive reinforcement for an incompatible behavior, while negative behaviors result in time out periods. (Marks & Ball, 1974; Weiher & Harman, 1975).

The second approach speculates that some of these negative behaviors are self-stimulation (stereotypies, Reardon & Bell, 1970) or primitive, possibly innate, responses (territorial aggression, Paluck and Esser, 1971) to the crowded, deprived institutional environment. According to this postulation, treatment emphasis should focus on changing the institutional environment to increase stimulation and overcome stress which results from crowding (Kreger, 1971).

Although the majority of studies are derived from the former approach, the effects of changing reinforcement contingencies is usually confounded by the addition of extra attention from the staff which in part reduces some of the stimulus deprivation. The results of research on the elimination of self-injurious behaviors indicates that while punishment was an effective means of reducing those behaviors in the experimental situation, the reduction was situation-specific (Corte, et al, 1971), unless special procedures were built in to ensure generalization to other situations (Hall, et al, 1973; Young & Wincze, 1974). These procedures consist of remote-control of the dispensing of aversive reinforcement and one-way mirror observations, so that the learner is unable to differentiate between those agents and sets of conditions under which the behaviors will be ignored and those under which it will be punished.

Stereotypies or repetitive behaviors such as rocking are generally viewed as responses to frustration or self-stimulation. Often the treatment consists of increasing the level of environmental stimulation either visual or auditory. Generally an increase in visual stimulation results in a decrease in stereotyped behaviors; while the results of increasing auditory stimulation have yielded a variety of contradictory results (Forehand & Baumeister, 1970 (a), 1970 (d); Higgenbottam & Chow, 1975; Reardon & Bell, 1970; Smeets, 1972; Stevens, 1971). It seems that some auditory stimulation is considered to be noxious by these retardates and results in an increase in rocking. Also, when

music is used, tempo seems to have an influence on whether or not the music will serve to facilitate or reduce rate of rocking. Since currrently it is not possible to predict the results of increases in auditory stimulation, any attempts to increase levels of environmental stimulation would probably be better off using visual stimulation until the contradictions have been resolved through further research.

In short, the Warren & Burns (1970) hypothesis that different negative behaviors may serve different functions would seem to serve as a tentative guide for selecting a treatment plan to eliminate negative behaviors. The first step in treatment procedure selection would be an attempt to examine what function the particular negative behavior was serving for the resident. For example, (1) does it occur more when the resident is confined in a crib than when the resident is free to wander around a playroom? (2) is the behavior generally ignored by the staff, or does it result in immediate attention? (3)do any particular events or behaviors immediately precede the onset of the negative behaviors? Once the functions of the behaviors have been determined then a treatment plan can be devised in order to extinguish the undesirable behavior and substitute behaviors which are more appropriate. Thus, if headbanging is found to be a method of obtaining attention, besides extinguishing the behavior, the resident might be trained to use electronic signaling devicesto call for help (see communication: Hagen, et al, 1973). On the other hand if the behaviors appear to be a form of self-stimulation, environmental modification would

be the more desirable form of treatment.

When planning programs addressed to the reduction of negative behaviors of the severely to profoundly mentally retarded a simplistic selection of a treatment procedure will only tend to mask the dynamics of such behaviors.

A first level planning priority is to assess individual behaviors and their functions. Functional analysis of behaviors will allow for the determination of:

1. precipitating events leading up to exhibited negative behaviors.
2. the environment and ecology in which the negative behaviors take place.
3. the consequences of negative behaviors.

Through assessment, analysis and determination, treatment programs can more accurately focus upon such dimensions as environmental manipulation of redistribution of attention.

CONDITIONING METHODOLOGY

112

CONDITIONING - PARADIGMS

Baker, B.L. & Ward, M.H. Reinforcement therapy for behavioral problems in severely retarded children. American Journal of Orthopsychiatry, 1971, 41, 124-135.

This study investigated the effectiveness of operant procedures with retardates with severe behavioral disturbances. The program was designed to modify acting out behaviors, and develop self-help and pre-nursery school skills. Reinforcement procedures were: time out, token economy and social reinforcements. Subjects with specific acting out behavior problems benefited more than subjects who had also been diagnosed as autistic.

Hollis, J.H. & Gorton, C.E. Training severely and profoundly developmentally retarded children. Mental Retardation, 1967, 5, 20-24.

This article surveys trends in research on profoundly and severely retarded children and recommends the development and use of operant procedures for training imitation and self-care skills. They also review possible methods for developing social reinforcements in low functioning children.

Nawas, M.M. & Braun, S.H. The use of operant techniques for modifying the behavior of the severely and profoundly retarded: Part I. Introduction and initial phase. Mental Retardation, 1970, 8 (2) 2-6.

This is the first of a series of three papers which explain how to institute an operant behavior modification program. Part I elaborates the basic steps which must be taken in order to enhance the viability of the program. These steps are:(1) assuming the proper attitude; (2) specifying goals; (3) defining operations; (4) recording observations; (5) spotting needs for environmental change; and (6) identifying the reinforcers.

Nawas, M.M. & Braun, S.H. The use of operant techniques for modifying the behavior of the severely and profoundly retarded: Part II: The techniques. Mental Retardation, 1970, 8, (3), 18-24.

Part 2 consist of a delineation of the basic operant techniques used to increase the frequency of desirable behaviors and to decrease the frequency of undesirable behaviors. Research is also revieved which provides information on such parameters as schedules of reinforcement, amount of reinforcement, and the timing of reinforcement.

Nawas, M.M. & Braun, S.H. An overview of behavior modification with the severely and profoundly retarded: Part III: Maintenance of change and epilogue. Mental Retariation, 1970, 8, (4), 4-11.

Part 3 presents the ways in which complex behavior chains can be built up in the learner's behavior repertoire. Methods for maintaining these behaviors in the absense of concrete reinforcement are also discussed.

Roos, P. & Oliver, M. Evaluation of operant conditioning with institutionalized retarded children. American Journal of Mental Deficiency, 1969, 74, 325-330.

The effectiveness of an operant conditioning training program was evaluated by comparing the progress made by the children in the program with children in two control groups. Children in one control group received similar content presented according to standard special education theory, while the third group received no training. Content of the curricula were self-help, social and communicative skills. The operant group showed significantly greater improvement than either of the other two groups.

Rose, S.M. Trace and delay classical eyelid conditioning in severely and profoundly retarded subjects as a function of interstimulus interval. American Journal of Mental Deficiency, 1972, 77, 39-45.

Two classical conditioning paradigms were used to condition eyeblinks to tones in low functioning subjects. Trace conditioning consists of the presentation of the conditioned stimulus followed by a brief interval, followed by the presentation of the unconditioned stimulus. The subject must retain the conditioned stimulus in the form of a trace. Delay conditioning consists of the presentation of the CS for a designated interval and at some point during the interval the unconditioned stimulus is introduced. Retention of a stimulus trace is not required. Results indicated that at lower interstimulus intervals trace and delay conditioning were equally effective, but as the interval was increased, delay conditioning was more effective than trace conditioning. Compared with results from studies with normal subjects, this suggests a deficit either in trace maintenance, or input processing.

Bailey, J. & Meyerson, L. Vibration as a reinforcer with a profoundly retarded child. Journal of Applied Behavior Analysis, 1969, 2, 135-137.

Vibration was used as a reinforcer in order to promote the lever pressing behavior of a blind profoundly retarded child. Little response decrement was noted, and the advantages of using vibration as opposed to food as a reinforcement are discussed.

Barrett, B.H. & McCormack, Jr., J.E. Varied-teacher tutorials: a tactic for generating credible skills in severely retarded people. Mental Retardation, 1973, 11, 14-19.

Twenty-four severely retarded individuals were taught a variety of academic and prevocational skills using the varied-teacher tutorial method which consists of varying the trainer across training sessions. The advantage of the method is that if individuals receive reinforcement from an variety of reinforcing agents the effects of training will be more generalizable. Some data indicated that the learning rate was not impaired.

Gardner, W.I. Use of punishment procedures with the severely retarded: a review. American Journal of Mental Deficiency, 1969, 74, 86-103.

This article consists of a review of research on the use of punishment procedures with severely and profoundly retarded children. The author concludes that: (1) there is evidence that punishment procedures contribute to behavior change in severely and profoundly retarded children; (2) there is some support for the position that the deceleration effects of punishment are not temporary when used in a broader program of positive reinforcement for alternative responses; and (3) there is some evidence that supports the position that social disruption and other negative side effects do not necessarily result from use of punishment procedures.

Green, R.J. & Hoats, D.L. Aversive tickling: a simple conditioning technique. Behavior Therapy, 1971, 2, 389-393.

Two case studies which attempted to use tickling as a negative reinforcer are reported. Since the reinforcement was only mildly aversive it eliminated only behaviors which were not highly motivated failed to eliminate behaviors which were accompanied by ang[illegible]ther emotional reactions.

Halliday, G.W. & Evans, J.M. Somatosensory enrichment of a deaf blind retarded girl through vibration. Perceptual and Motor Skills, 1974, 38, 880.

Vibration was used as positive reinforcement in order to increase the frequency of smiling behavior of a blind and deaf profoundly retarded female. An electric tooth brush was used as a vibrator and was applied to the subject's hand.

Libb, J.W. Fixed-interval frustrative non-reward in profound retardates. Psychonomic Science, 1970, 19, 219-220.

Three profoundly retarded males received edible reinforcements for plunger pulling on a fixed interval schedule. Following stabilization the contingency was changed so that 25% of the trials were not reinforced. Results indicated that for 30 seconds following failure to receive reinforcement responding rate increased. These results support the frustration effect theory which states that when a response which was previously reinforced is not rewarded, the following response is significantly quicker and more vigorous.

Libb, J.W. Stimuli previously associated with reinforcement: reinforcing or frustrating to the mentally retarded? Journal of Experimental Child Psychology, 1972, 14, 1-10.

Two opposing predictions can be made on the effects of the presentation of stimuli which have been previously paired with reinforcement. The conditioned reinforcement interpretation predicts subjects would respond in the same manner as in the reinforcement condition, while frustration theory predicts an immediate increase in responding subsequent to the presentation, resulting from frustration of an expectancy of reward. These hypotheses were tested using six profoundly retarded subjects. Results were consistent with the frustration hypothesis.

Tramontana, J. Social versus edible rewards as a function of intellectual level and social class. American Journal of Mental Deficiency, 1972, 77, 33-38.

This study investigated the differences between type of reinforcement (social, edible, or no reinforcement) on performance of the marble drop task. Results for severely retarded subjects indicated that edible reinforcement had a greater effect on performance that social reinforcement.

Wallace, R.F. & Mulder, D.W. Fixed-ratio responding with human subjects. Bulletin of the Psychonomic Society, 1973, 1, 359-362.

Three severely retarded adults received edible reinforcements contingent on lever pressing. Fixed ratio schedules of reinforcement were employed. Although fixed ratio size was directly related to the length of the post-reinforcement pause, it had no significant effect on response rate once responding was resumed following the pause.

SUMMARY

Although there are many articles which recommend the use of operant techniques for training severely and profoundly retarded children, there is little research comparing operant procedures with other training techniques. One study (Roos & Oliver, 1969) did compare an operant program with a program consisting of similar content but presented according to standard educational procedure. Although the results indicated that the operant group improved significantly more than the standard procedure group, little is known about what particular aspects of operant training contributed to the greater improvement.

It seems that two of the major differences between operant procedures and standard educational practice are: (1) complex behaviors are broken down into a sequence or chain of responses which are taught individually; and (2) a consistent schedule of reinforcement is used in order to ensure that the learner will elicit the responses. In order to determine which specific techniques are responsible for the improvements, differences such as these would have to be systematically varied and tightly controlled.

Although, in general, edible reinforcements seem to have a greater effect on performance of severely retarded children than social reinforcements (Tramontana, 1972), for individual children the standard edibles can be ineffective in eliciting the desired responses. For

example, for anorexic retardates edibles are aversive stimuli. Futhermore, in many areas the standard three meals cannot be legally withheld from low functioning retardates as negative reinforcement for extinguishing undesirable behaviors. In these situations vibration has been used as positive reinforcement with blind profoundly retarded individuals (Bailey & Meyerson, 1969; Halliday & Evans, 1974) or play with desirable objects; negative reinforcements (Gardner, 1969; Green & Hoats, 1971) have also been used in order to extinguish undesirable responses.

Two problems arise in the literature on the use of reinforcement procedures with the severely and profoundly retarded population. The first is in the area of secondary reinforcement. According to several theories if a neutral stimulus is paired with a positive reinforcer eventually the stimulus will acquire reinforcement value. However, research offers evidence to the contrary for the severely and profoundly retarded (Libb, 1972). This finding would predict that social reinforcement which does not initially have much effect on performance would not acquire reinforcement value when paired with edible reinforcements. Whether or not this prediction is upheld with this population is a subject for further research.

The second problem, mentioned in much of the literature is the problem of achieving transfer from the training situation to the ward situation. If operant procedures are to be effective, ways must be developed to ensure that the results of training programs generalize.

One approach which has yielded success in transfer is the varied-teacher tutorial method (Barrett & McCormack, 1973) in which the learner works with a variety of different teachers during the training sessions and receives experience in receiving reinforcement from a variety of different agents. In general, results of training indicate that often transfer cannot be expected unless specific procedures are built into training programs. (For specific ways in which the problem of transfer has been handled with regard to specific types of training see the relevant sections i.e., life skills, communication, etc.)

In sum, considerable research is needed comparing the relative effectiveness of programs which employ operant techniques with other types of training, before one could make a judgement regarding which approach is the most effective for training the severely and profoundly retarded population. Although operant procedures have yielded success in a variety of areas of training, precautions must be taken during the planning of a program in order to ensure maintenance and transfer.

ASSESSMENT

Gardner, J.M. & Giampa, F.L. Utility of three behavioral indices for studying severely and profoundly retarded children. American Journal of Mental Deficiency, 1971, 76, 352 - 356.

This investigation examines the utility of three behavioral indices for purposes of diagnosis, placement, programming and measuring changes in severely and profoundly retarded children. Results indicated that the Cain-Levine Social Competence Scale was not useful in differentiating among low functioning children because it did not produce a normal distribution. The Vineland Social Maturity Scale produced a global differentiation between low functioning individuals and was considered to be a test of overall competence. The Comprehensive Behavior Checklist also differentiated between low functioning children and had the added advantage of providing subscale scores which are useful for placement and programming decisions.

Hamilton, J.L. & Budoff, M. Learning potential among the moderately and severely mentally retarded. Mental Retardation, 1974, 12, 33 - 36

Moderately and severely retarded individuals were tested on a matching to sample task. Half of the subjects were then trained on the task. Then all of the subjects were retested. Subjects in the trained

group scored significantly higher on both immediate and delayed posttests compared with the control group. The results suggest that one session testing is inappropriate for severely retarded children. A better paradigm would be testing, cueing, then retesting in order to assess learning potential.

Jacobson, L.I., Bernal, G. & Greeson, L.E. Effects of programmed social interaction on the measured intelligence of institutionalized moderately and severely retarded children. Journal of Mental Deficiency Research, 1974, 18, 87 - 91.

This study examined the effects of socio-motivational factors on intelligence test scores of moderately and severely retarded children. Subjects were assigned to one of three conditions: (a) ten hours of social interaction with the experimenter; (b) twenty hours of social interaction; (c) no interaction. Intelligence tests served as pre and post measures. Results indicated small but significant gains for both treatment groups.

Lyle, C.E. & Thomas, S.B. Influence of age, sex, and IQ differences on behavior of profound retardates as measured by the rating scale technique. Journal of Psychology, 1971, 79, 243 - 255.

A large sample of profoundly retarded individuals was rated by staff members on such skills as toileting, grooming and language. The investigators reported that CA and IQ were significantly related to the

scores on these behavior rating scales, while sex was not significantly related to any of the behaviors. These results implied that one could expect these behaviors to improve with increases in CA. Higher IQ individuals demonstrated higher overall performance on these scales.

Sinson, J.C. Assessment and social education of severely subnormal children in a preschool unit. British Journal of Mental Subnormality, 1973, 19, 21 - 32.

Severely retarded children were given an opportunity to learn a variety of skills in a program of intensive stimulation. Learning potential was assessed according to the children's overall performance in the program rather than according to one session standardized test scores. Results indicated that the children made substantial gains in a variety of areas such as communication, dexterity and self-feeding.

Soule, D. Teacher bias effects with severely retarded children. American Journal of Mental Deficiency, 1972, 77, 208 - 211.

This study attempted to examine the effects of experimentally induced teacher expectancy biases on the subsequent behavior of severely retarded children. Cottage parents were informed that psychological assessments indicated that certain children had the potential for performing at a higher level than their present performance indicated. At the end of six months a comparison between this experimental group

and control groups yielded no significant effects for inducing higher expectancy biases.

Tweedie, D. A method of audiological screening with the severe to profound mentally retarded. Training School Bulletin, 1972, 68, 227 - 230.

This study presents a new method for screening severely and profoundly retarded individuals for hearing disabilities. The method involves isolating the individuals and observing their reactions to recorded sounds through a one-way mirror.

SUMMARY

Many of the studies annotated in this review point to the problems of assessing the effectiveness of training programs. Two chief problems in this area are: (1) it is difficult to determine the degree to which low scores are a function of social, motivational, or environmental deprivation factors rather than intellectual deficits; (2) often training programs result in specific gains which do not appear on standardized tests of global functioning.

Two approaches have been used to cope with the first problem. One consists of giving the testees extra periods of social interaction with the tester prior to the testing periods (Jacobson, et al, 1974). A second takes the position that standardized tests inappropriately assume certain necessary prior learning experiences. Therefore new tests of learning potential must be constructed which give the testee an opportunity to learn something and evaluate his or her success in learning (Hamilton & Budoff; 1974; Sinson, 1973).

The second problem calls for the development of standardized tests with specific behavior sub-scales which would provide information necessary for diagnostic, placement and programming decisions. Currently many investigators assess the effects of training programs by developing their own specific behavior checklists to use as pre- and posttest measures, while standardized intelligence tests are used only to see if the training generalizes to overall

level of intellectual functioning. However, often little is known about the reliability of these measures, and an attempt has been made to develop a standardized test (Gardner & Giampa, 1971) which provides subtest scores useful for programming and placement decisions.

In short, research with severely and profoundly retarded children would greatly benefit from the development of new tests geared specifically for use with this population. At present, the best one can do is evaluate training programs in terms of trainees' progress on specific program goals, and not expect significant improvements in overall levels of functioning as assessed by standardized tests.